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US Department
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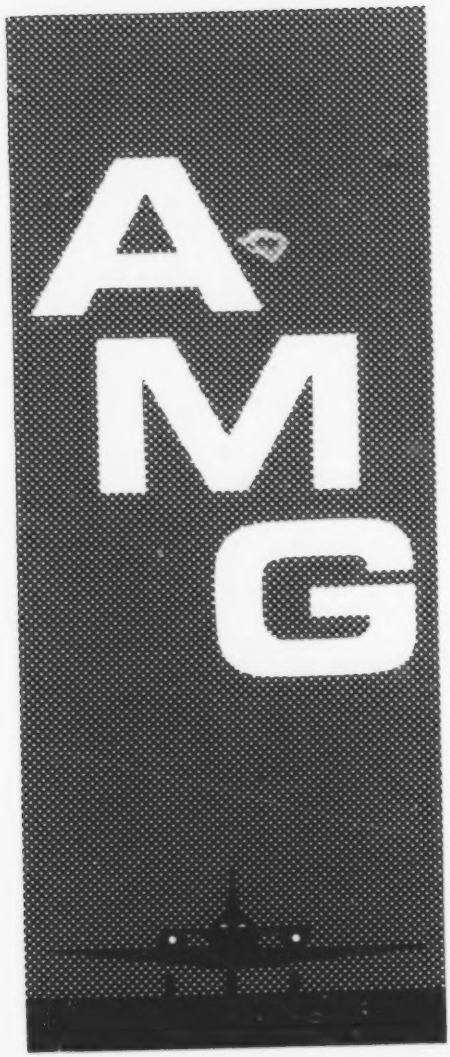

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AVIATION MECHANIC

• GENERAL

QUESTION BOOK

Expires September 1, 1988

AVIATION MECHANIC GENERAL

Question Book

1986

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Aviation Standards National Field Office

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READEX FICHE best copy available

MAXIMUM TIME ALLOWED FOR TEST: 2 HOURS

Materials to be used with this question book when used for airman testing:

1. Airman Written Test Application which includes the answer sheet.
2. Question Selection Sheet which identifies the questions to be answered.
3. Plastic overlay sheet which can be placed over electrical drawings, graphs, and charts for making pencil marks or for tracing schematics for analysis purposes. If you are not provided the overlay, request one from the test monitor.

GENERAL INSTRUCTIONS

1. Read the instructions on page 1 of the Airman Written Test Application and complete the form on page 4.

2. The question numbers in this question book are numbered consecutively beginning with No. 4001. Refer to the question selection sheet to determine which questions to answer.

3. For each item on the answer sheet, find the appropriate question in the book.

4. Mark your answer in the space provided for that item on the answer sheet.

5. Remember:

   Read each question carefully and avoid hasty assumptions. Do not answer until you understand the question. Do not spend too much time on any one question. Answer all of the questions that you readily know and then reconsider those you find difficult.

   If a regulation is changed after this question book is printed, you will receive credit until the affected questions are revised.

The minimum passing grade is 70.

WARNING

§ 65.18 Written tests: cheating or other unauthorized conduct.

(a) Except as authorized by the Administrator, no person may—

(1) Copy, or intentionally remove, a written test under this Part;

(2) Give to another, or receive from another, any part or copy of that test;

(3) Give help on that test to, or receive help on that test from, any person during the period that test is being given;

(4) Take any part of that test in behalf of another person;

(5) Use any material or aid during the period that test is being given; or

(6) Intentionally cause, assist, or participate in any act prohibited by this paragraph.

(b) No person who commits an act prohibited by paragraph (a) of this section is eligible for any airman or ground instructor certificate or rating under this chapter for a period of one year after the date of that act. In addition, the commission of that act is a basis for suspending or revoking any airman or ground instructor certificate or rating held by that person.

PREFACE

This question book has been developed by the FAA (Federal Aviation Administration) for use by applicants who are preparing for the Aviation Mechanic General Written Test and also for use by FAA Testing Centers and FAA Designated Written Test Examiners in administering the test. It is issued as FAA–T–8080–10A, Aviation Mechanic General Question Book, and is available to the public from:

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or from U.S. Government Printing Office Bookstores located in major cities throughout the U.S.

The questions included in this publication are predicated on regulations, principles, and practices that were valid at the time of publication. The question selection sheets prepared for use with this question book are security items and are revised at frequent intervals.

The Federal Aviation Administration does not supply the correct answers to questions included in this book. Students should determine the answers by research and study, by working with instructors, or by attending ground schools. The Federal Aviation Administration is NOT responsible for either the content of commercial reprints of this book or the accuracy of the answers they may list.

Comments regarding this publication should be directed to:

U.S. Department of Transportation
Federal Aviation Administration
Aviation Standards National Field Office
Examinations Standards Branch
Airworthiness Section, AVN–133
P.O. Box 25082
Oklahoma City, Oklahoma 73125

CONTENTS

Page

General Instructions iii
Preface v
Contents vii
Introduction 1
The Written Test 1
Retesting 1

Appendix 1

Questions ..... 1 thru 56

Appendix 2

References ..... 1 thru 4

INTRODUCTION

The requirements for a mechanic certificate and ratings, and the privileges, limitations, and general operating rules for certificated mechanics are prescribed in Federal Aviation Regulations Part 65, Certification: Airmen Other Than Flight Crewmembers. Any person who applies and meets the requirements is entitled to a mechanic certificate.

At FAA Testing Centers, or at an FAA Designated Written Test Examiner's facility, the applicant is issued a "clean copy" of this question book, an appropriate 50-item question selection sheet which indicates the specific questions to be answered, and AC Form 8080-3, Airman Written Test Application, which contains the answer sheet. The question book contains all the supplementary material required to answer the questions. Supplementary material, such as an illustration, will normally be found within one page of the question with which it is associated. Where this is not practicable, page reference numbers will be given.

THE WRITTEN TEST

Questions and Scoring

The test questions are of the multiple-choice type. Answers to questions listed on the question selection sheet should be marked on the answer sheet of AC Form 8080-3, Airman Written Test Application. Directions should be read carefully before beginning the test. Incomplete or erroneous personal information entered on this form delays the scoring process.

The answer sheet is sent to the Mike Monroney Aeronautical Center in Oklahoma City where it is scored by a computer. Shortly thereafter AC Form 8080-2, Airman Written Test Report, is sent to the applicant listing the score and test questions missed.

The applicant must present this report for an oral and practical test, or for retesting in the event of written test failure.

Taking the Test

The test may be taken at FAA Testing Centers, FAA Written Test Examiners' facilities, or other designated places. After completing the test, the applicant must surrender the issued question book, question selection sheet, answer sheet, and any papers used for computations or notations, to the monitor before leaving the test room.

When taking the test, the applicant should keep the following points in mind:

1. Answer each question in accordance with the latest regulations and procedures.
2. Read each question carefully before looking at the possible answers. You should clearly understand the problem before attempting to solve it.
3. After formulating an answer, determine which of the alternatives most nearly corresponds with that answer. The answer chosen should completely resolve the problem.
4. From the answers given, it may appear that there is more than one possible answer; however, there is only one answer that is correct and complete. The other answers are either incomplete or are derived from popular misconceptions.
5. If a certain question is difficult for you, it is best to proceed to other questions. After the less difficult questions have been answered, return to those which gave you difficulty. Be sure to indicate on the question selection sheet the questions to which you wish to return.
6. When solving a computer problem, select the answer nearest your solution. The problem has been checked with various types of computers; therefore, if you have solved it correctly, your answer will be closer to the correct answer than to any of the other choices.
7. To aid in scoring, enter personal data in the appropriate spaces on the test answer sheet in a complete and legible manner. Enter the test number printed on the question selection sheet.

Retesting—FAR 65.19

Applicants who receive a failing grade may apply for retesting by presenting their AC Form 8080-2, Airman Written Test Report—

(1) after 30 days from the date the applicant failed the test; or

(2) the applicant may apply for retesting before the 30 days have expired upon presenting a signed statement from an airman holding the certificate and rating sought by the applicant, certifying that the airman has given the applicant additional instruction in each of the subjects failed and that the airman considers the applicant ready for retesting.

NOTE: Blank spaces may appear on several pages of this publication. This permits referenced figures and tables to appear as close as possible to their related questions.

APPENDIX 1

AVIATION MECHANIC GENERAL

4001. The working voltage of a capacitor to which a.c. or pulsating d.c. is applied should be

1—the same as or greater than the applied voltage.
2—at least 50 percent greater than the applied voltage.
3—1.41 times the applied voltage.
4—.707 times the applied voltage.

4002. If a circuit contains 10 ohms of resistance, 20 ohms of inductive reactance, and 30 ohms of capacitive reactance, it is said to be

1—inductive.
2—in resonance.
3—resistive.
4—capacitive.

4003. The opposition offered by a coil to the flow of alternating current is called

1—conductivity.
2—impedance.
3—reluctance.
4—inductive reactance.

4004. An increase in which of the following factors will cause an increase in the inductive reactance of a circuit?

1—Inductance and frequency.
2—Capacitance and voltage.
3—Resistance and voltage.
4—Resistance and capacitive reactance.

4005. In an alternating current circuit, the effective voltage

1—is equal to the maximum instantaneous voltage.
2—is greater than the maximum instantaneous voltage.
3—may be greater than or less than the maximum instantaneous voltage.
4—is less than the maximum instantaneous voltage.

4006. The amount of electricity a capacitor can store is directly proportional to

1—the distance between the plates and inversely proportional to the plate area.
2—the plate area and is not affected by the distance between the plates.
3—the plate area and inversely proportional to the distance between the plates.
4—the distance between the plates and is not affected by the plate area.

4007. A transformer with a step–up ratio of 5 to 1 has a primary voltage of 24 volts and a secondary amperage of 0.20 ampere. What is the primary amperage (disregard losses)?

1—1 ampere.
2—4.8 amperes.
3—0.40 ampere.
4—Cannot be determined from the information given.

4008. What is the phase relationship between the current and voltage in an inductive circuit?

1—The current lags the voltage by 0°.
2—The current lags the voltage by 90°.
3—The current leads the voltage by 90°.
4—The current leads the voltage by 0°.

4009. Current flow is measured in terms of

1—amperes.
2—volts.
3—watts.
4—electron flow.

4010. Which of the following will require the most electrical power during operation?

(Note: 1 hp. = 746 watts.)

1—A 12–volt motor requiring 8 amperes.
2—Four 30–watt lamps in a 12–volt parallel circuit.
3—Two lights requiring 3 amperes each in a 24–volt parallel system.
4—A 1/10–horsepower, 24–volt motor which is 75 percent efficient.

4011. How much power must a 24–volt generator furnish to a system which contains the following loads?

UNIT	RATING
One motor (75 percent efficient)	1/5 hp.
Three position lights	20 watts each
One heating element	5 amp.
One anticollision light	3 amp.

(Note: 1 hp. = 746 watts.)

1—18.75 watts.
2—402 watts.
3—385 watts.
4—450 watts.

4012. If a unit in a 28–volt aircraft electrical system has a resistance of 10 ohms, how much power will it use?

1—280 watts.
2—7.84 watts.
3—78.4 watts.
4—28 watts.

4013. A 12–volt electric motor has 1,000 watts input and 1 horsepower output. Maintaining the same efficiency, how much input power will a 24–volt, 1 horsepower electric motor require?

(Note: 1 hp. = 746 watts.)

1—1,000 watts.
2—2,000 watts.
3—500 watts.
4—Cannot be determined from the information given.

4014. How many amperes will a 28–volt generator be required to supply to a circuit containing five lamps in parallel, three of which have a resistance of 6 ohms each and two of which have a resistance of 5 ohms each?

1—1.11 amperes.
2—1 ampere.
3—0.9 ampere.
4—25.23 amperes.

4015. The wattage rating of a carbon resistor is determined by

1—a gold band.
2—a silver band.
3—the size of the resistor.
4—a red band.

4016. The potential difference between two conductors which are insulated from each other is measured in

1—ohms.
2—volts.
3—amperes.
4—coulombs.

4017. The ratio of the true power to the apparent power in an a.c. electrical circuit is called the power factor. If the true power and the power factor of a circuit are known, the apparent power can be determined by

1—multiplying the true power times 100 times the power factor.
2—multiplying the power factor times 100 times the true power.
3—dividing the true power times 100 by the power factor.
4—dividing the power factor times 100 by the true power.

4018. A 24–volt source is required to furnish 48 watts to a parallel circuit consisting of four resistors of equal value. What is the voltage drop across each resistor?

1—12 volts.
2—6 volts.
3—3 volts.
4—24 volts.

4019. When calculating power in a reactive or inductive a.c. circuit, the true power is

1—more than the apparent power.
2—more than the apparent power in a reactive circuit and less than the apparent power in an inductive circuit.
3—less than the apparent power in a reactive circuit and more than the apparent power in an inductive circuit.
4—less than the apparent power.

4020. Determine the power furnished in watts by the generator of the circuit in Figure 1.

1—288 watts.
2—24 watts.
3—48 watts.
4—12 watts.

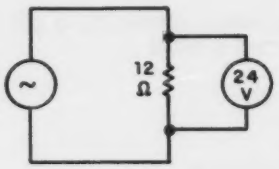

Figure 1

4021. If resistor R_5 is disconnected at the junction of R_4 and R_3 as shown, what will the ohmmeter read? (See Figure 2.)

1—9 ohms.
2—2.76 ohms.
3—3 ohms.
4—12 ohms.

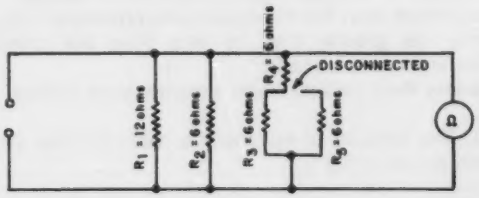

Figure 2

4022. If resistor R_3 is disconnected at terminal D, what will the ohmmeter read? (See Figure 3.)

1—Infinite resistance.
2—0 ohm.
3—10 ohms.
4—20 ohms.

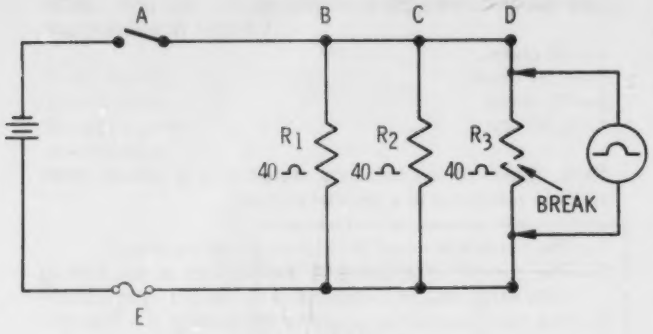

Figure 3

4023. With an ohmmeter connected into the circuit as shown, what will the ohmmeter read in Figure 4?

1—20 ohms.
2—Infinite resistance.
3—0 ohm.
4—10 ohms.

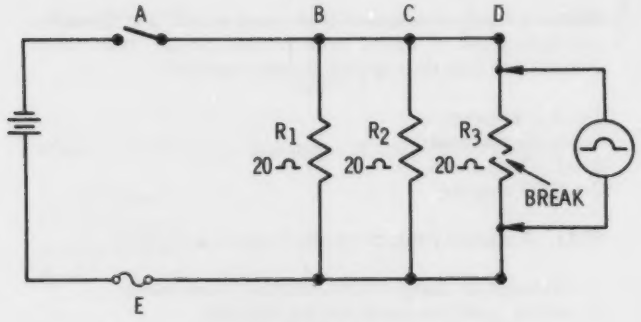

Figure 4

4024. In Figure 5, how many instruments (voltmeters and ammeters) are installed correctly?

1—Three.
2—One.
3—Two.
4—Four.

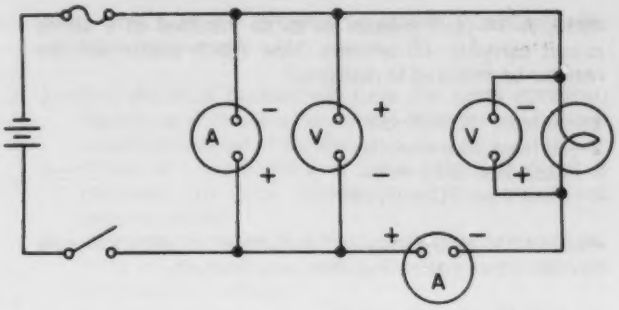

Figure 5

4025. The secondary voltage of a transformer depends upon the efficiency of the transformer and the ratio of the number of turns in the primary winding to the

1—number of turns in the secondary winding.
2—amount of current flowing in the primary winding.
3—material from which the core is constructed.
4—distance separating the windings.

4026. The correct way to connect a test voltmeter in a circuit is

1—in series with a unit.
2—between source voltage and the load.
3—in parallel with a unit.
4—to place one lead on either side of the fuse.

4027. A cabin–entry light of 10 watts and a dome light of 20 watts are connected in parallel to a 30–volt source. If the voltage across the 10–watt light is measured, it will be

1—one–third of the input voltage.
2—twice the voltage across the 20–watt light.
3—equal to the voltage across the 20–watt light.
4—half the voltage across the 20–watt light.

4028. What device is used to measure the very high insulation resistance of electric cables?

1—High–resistance voltmeter.
2—Moving iron–vane meter.
3—Megger.
4—Multimeter.

4029. Before troubleshooting an electrical circuit with a continuity light, the circuit must be

1—connected to the aircraft battery.
2—connected to the aircraft generator.
3—isolated.
4—connected to an external source of power.

4030. A 14–ohm resistor is to be installed in a series circuit carrying .05 ampere. How much power will the resistor be required to dissipate?

1—At least .70 milliwatt.
2—At least 35 milliwatts.
3—Less than .035 watt.
4—Less than .70 milliwatt.

4031. What is the maximum number of electrical wire terminals that can be installed on one stud?

1—Four terminals per stud.
2—Three terminals per stud.
3—Two terminals per stud.
4—As many terminals as you can stack on and still have the required number of threads showing through the nut.

4032. What would be the measured voltage of the series circuit in Figure 6 between terminals A and B?

1—1.5V.
2—3.0V.
3—4.5V.
4—6.0V.

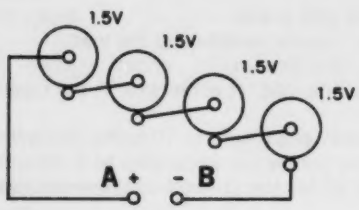

Figure 6

4033. The efficiency of power in an a.c. circuit is expressed by what term?

1—Volt–amperes.
2—True power.
3—Power factor.
4—Apparent power.

4034. The current in a 60–watt, 120–volt electric light bulb is

1—0.8 amp.
2—2 amps.
3—1/3 amp.
4—1/2 amp.

4035. Which of the following will require the most electrical power? (Note: 1 hp. = 746 watts.)

1—Four 30–watt lamps arranged in a 12–volt parallel circuit.
2—A 12–volt landing gear retraction motor which requires 8 amperes when operating the landing gear.
3—A 1/10–horsepower, 24–volt motor which is 75 percent efficient.
4—A 24–volt anticollision light circuit consisting of two light assemblies which require 3 amperes each during operation.

4036. What unit is used to express electrical power?

1—Coulomb.
2—Volt.
3—Watt.
4—Ampere.

4037. What is the operating resistance of a 30–watt light bulb designed for a 28–volt system?

1—30 ohms.
2—1.07 ohms.
3—26 ohms.
4—0.93 ohm.

4038. Which of the following statements is correct when made in reference to a parallel circuit?

1—The current is equal in all portions of the circuit.
2—The current in amperes is the product of the EMF in volts times the total resistance of the circuit in ohms.
3—The total current is equal to the sum of the currents through the individual branches of the circuit.
4—The current in amperes can be found by dividing the EMF in volts by the sum of the resistors in ohms.

4039. Diodes are used in electrical power circuits primarily as

1—current eliminators.
2—circuit cutout switches.
3—rectifiers.
4—power transducer relays.

4040. If three resistors of 3 ohms, 5 ohms, and 22 ohms are connected in series in a 28–volt circuit, how much current will flow through the 3–ohm resistor?

1—9.3 amperes.
2—1.05 amperes.
3—1.03 amperes.
4—0.93 ampere.

4041. A good conductor of electricity is a material

1—through or along which electrons move freely.
2—whose protons are all on the outside.
3—that contains few electrons.
4—through or along which protons move freely.

4042. A circuit has an applied voltage of 30 volts and a load consisting of a 10–ohm resistor in series with a 20–ohm resistor. What is the voltage drop across the 10–ohm resistor?

1—15 volts.
2—10 volts.
3—20 volts.
4—30 volts.

4043. Find the total current flowing in the wire between points C and D in Figure 7.

1—6.0 amperes.
2—2.4 amperes.
3—3.0 amperes.
4—0.6 ampere.

4044. Find the voltage across the 8-ohm resistor using the drawing in Figure 7.

1—2.4 volts.
2—12 volts.
3—20.4 volts.
4—24 volts.

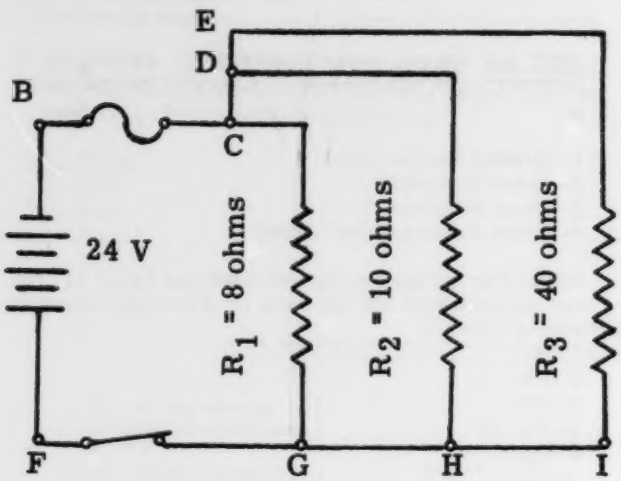

Figure 7

4045. Find the total resistance of the circuit in Figure 8.

1—16 ohms.
2—10.4 ohms.
3—2.6 ohms.
4—21.2 ohms.

$$R_t = R_c + R_1$$

$$R_a = \frac{1}{1/R_4 + 1/R_5}$$

$$R_b = R_a + R_2$$

$$R_c = \frac{1}{1/R_b + 1/R_3}$$

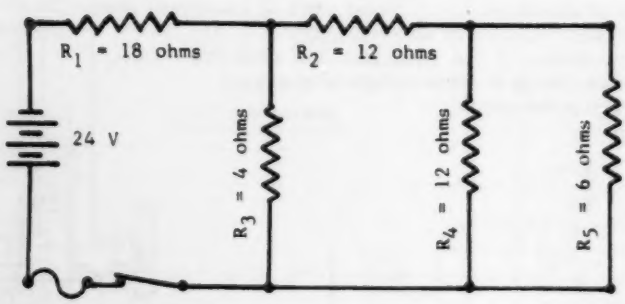

Figure 8

4046. Which of the following is correct in reference to electrical resistance?

1—Two electrical devices will have the same combined resistance if they are connected in series as they will have if connected in parallel.
2—If one of three bulbs in a parallel lighting circuit is removed, the total resistance of the circuit will become greater.
3—An electrical device that has a high resistance will use more power than one with a low resistance with the same applied voltage.
4—A 5-ohm resistor in a 12-volt circuit will use less current than a 10-ohm resistor in a 24-volt circuit.

4047. An electric cabin heater draws 25 amps at 110 volts. How much current will flow if the voltage is reduced to 85 volts?

1—19.3 amps.
2—44.0 amps.
3—4.4 amps.
4—1.93 amps.

4048. Determine the total current flow in the circuit in Figure 9.

1—0.2 amp.
2—1.4 amps.
3—0.4 amp.
4—0.8 amp.

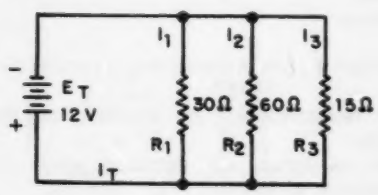

Figure 9

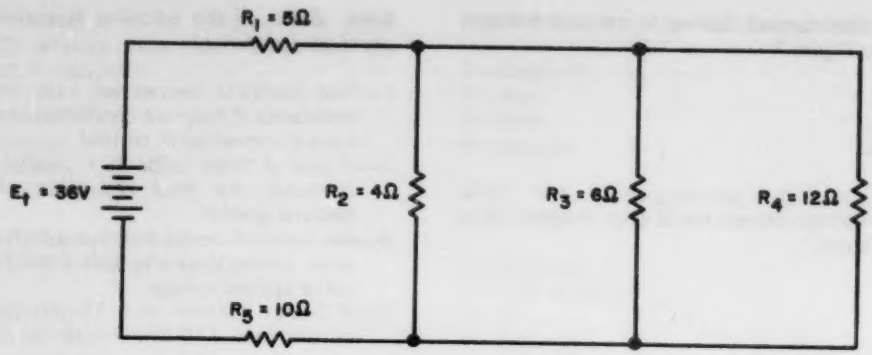

Figure 10

4049. The total resistance of the circuit in Figure 10 is

1—25 ohms.
2—35 ohms.
3—37 ohms.
4—17 ohms.

4050. A 48-volt source is required to furnish 192 watts to a parallel circuit consisting of three resistors of equal value. What is the value of each resistor?

1—36 ohms.
2—4 ohms.
3—8 ohms.
4—12 ohms.

4051. Which is correct concerning a parallel circuit?

1—Total resistance will be smaller than the smallest resistor.
2—Total resistance will decrease when one of the resistances is removed.
3—Total voltage drop is the same as the total resistance.
4—Total amperage remains the same, regardless of the resistance.

4052. The voltage drop in a conductor of known resistance is dependent on

1—the voltage of the circuit.
2—the amount and thickness of wire insulation.
3—only the resistance of the conductor and does not change with a change in either voltage or amperage.
4—the amperage of the circuit.

4053. An electric motor malfunctions causing it to overheat, which will cause an incorporated thermal switch to

1—prevent an open circuit.
2—break the circuit.
3—close the circuit.
4—break the circuit when cooled.

4054. With the landing gear retracted (see Figure 11), the red indicator light will not come on if an open occurs in wire

1—No. 19.
2—No. 7.
3—No. 16.
4—No. 17.

4055. Using Figure 11, the No. 7 wire is used to

1—open the DOWN indicator light circuit when the landing gear is retracted.
2—complete the PUSH-TO-TEST circuit.
3—open the UP indicator light circuit when the landing gear is retracted.
4—close the UP indicator light circuit when the landing gear is retracted.

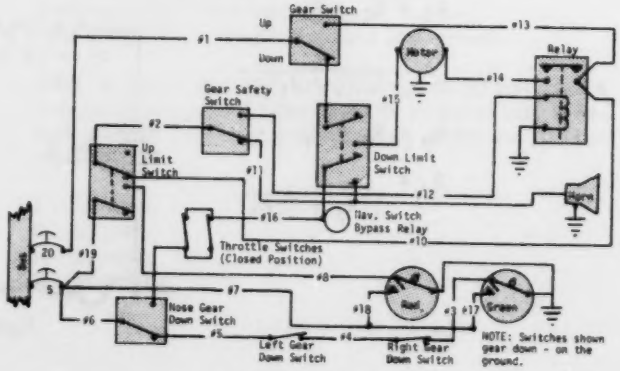

Figure 11

4056. What would be the effect if the PCO relay in Figure 12 failed to operate when the left-hand tank was selected?

1—The fuel pressure crossfeed valve would not open.
2—The fuel tank crossfeed valve would open.
3—The fuel tank crossfeed valve open light would illuminate.
4—The fuel pressure crossfeed valve open light would not illuminate.

4057. The TCO relay in Figure 12 will operate if 24 VDC is applied to the bus and the fuel tank selector is in the

1—right-hand tank position.
2—crossfeed position.
3—left-hand tank position.
4—normal position.

4058. With power to the bus and the fuel selector switched to the right-hand tank (see Figure 12), how many relays in the system are operating?

1—Three.
2—One.
3—Two.
4—Four.

4059. When electrical power is applied to the bus (see Figure 12), which relays are energized?

1—PCO and TCC.
2—PCC and TCC.
3—TCC and TCO.
4—PCO and PCC.

4060. Energize the circuit with the fuel tank selector switch selected to the left-hand position. Using the schematic in Figure 12, identify the switches that will change position.

1—5, 11, 12, 13, 15, 9, 10.
2—5, 6, 3, 7, 11, 13.
3—5, 6, 11, 15, 12, 13.
4—5, 7, 11, 15.

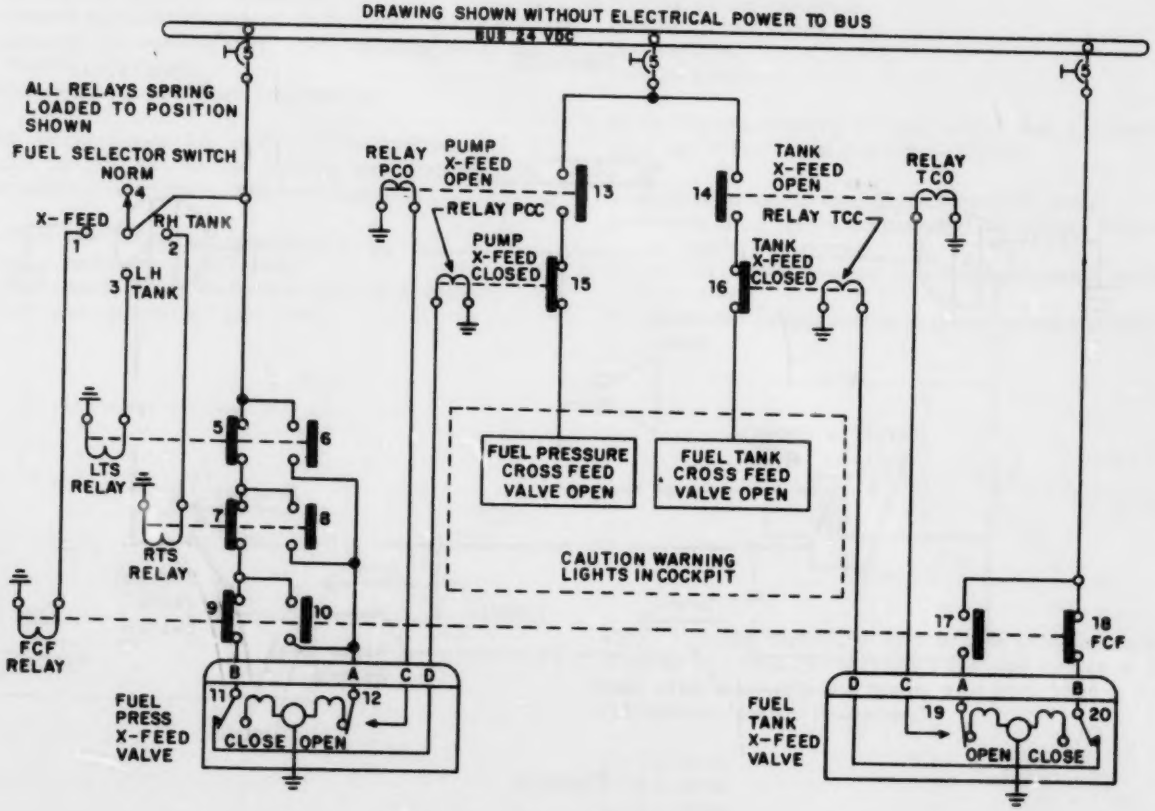

Figure 12

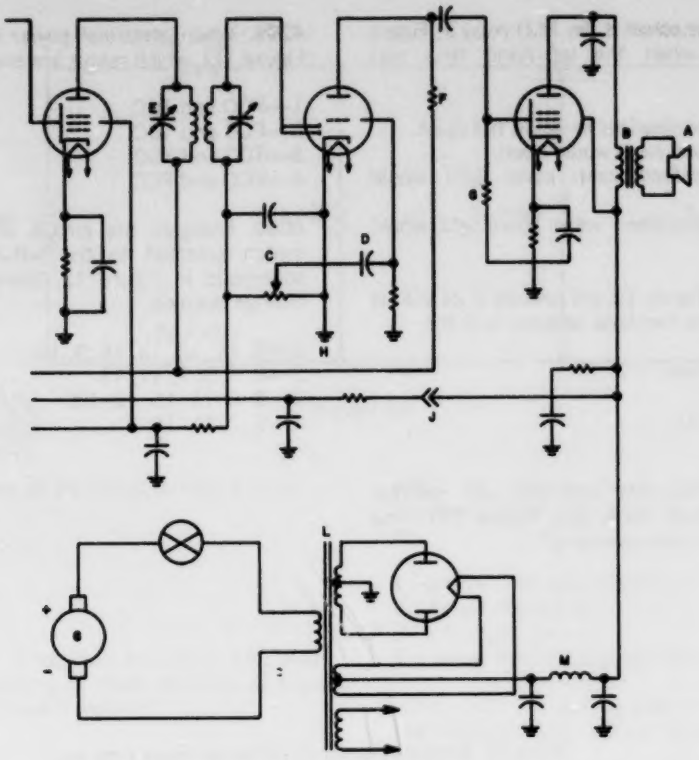

Figure 13

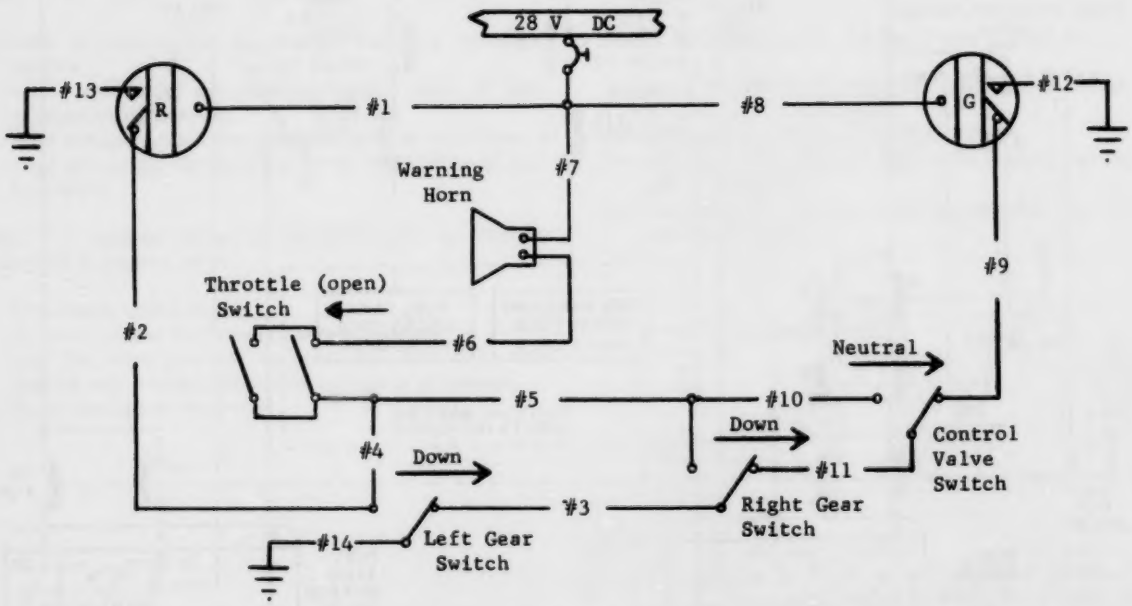

Figure 14

4061. Which of the components in Figure 13 is a potentiometer?

1—D.
2—E.
3—C.
4—M.

4062. In Figure 13, what electrical symbol is represented at E?

1—Fixed capacitor.
2—Fixed resistor.
3—Variable resistor.
4—Variable capacitor.

4063. When the landing gears are up and the throttles are retarded (see Figure 14), the warning horn will not sound if an open occurs in wire

1—No. 4.
2—No. 2.
3—No. 9.
4—No. 10.

4064. The control valve switch should be placed in the neutral position when the landing gears are down (see Figure 14) to

1—permit the test circuit to operate.
2—provide a ground for the red light.
3—prevent the warning horn from sounding when the throttles are closed.
4—remove the ground from the green light.

4065. Using Figure 15, under which condition will a ground be provided for the warning horn through both gear switches when the throttles are closed?

1—Right gear up and left gear down.
2—Anytime the gears malfunction.
3—Both gears up and the control valve out of neutral.
4—Left gear up and right gear down.

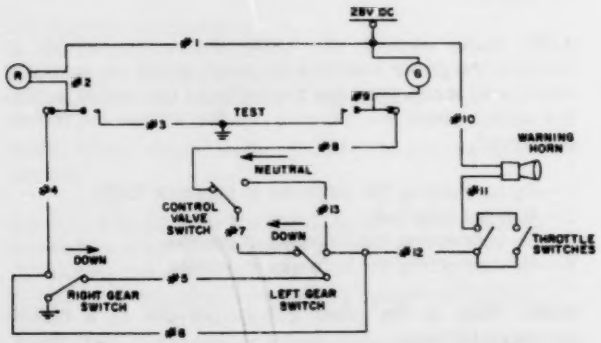

Figure 15

4066. When the throttles are retarded with only the right gear down (see Figure 15), the warning horn will not sound if an open occurs in wire

1—No. 5.
2—No. 13.
3—No. 8.
4—No. 6.

4067. When the landing gears are up and the throttles are retarded (see Figure 15), the warning horn will not sound if an open occurs in wire

1—No. 5.
2—No. 7.
3—No. 13.
4—No. 6.

4068. Schematic diagrams indicate the location of individual components in the aircraft

1—with aircraft station numbers of each component.
2—on the title block by federal stock number.
3—with respect to each other within the system.
4—with detail drawings of each component.

4069. When referring to an electrical circuit diagram, what point is considered to be at zero voltage?

1—The ground reference.
2—The current limiter.
3—The fuse.
4—The switch.

4070. Trouble-shooting an open circuit with a voltmeter as shown in this circuit (see Figure 16) will

1—permit current to flow and illuminate the lamp.
2—create a low resistance path and the current flow will be greater than normal.
3—restrict current flow and no voltage will appear on the voltmeter.
4—permit the battery voltage to appear on the voltmeter.

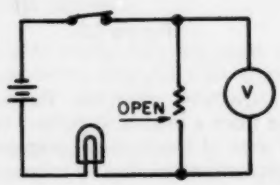

Figure 16

4071. A battery containing six lead-acid cells connected in series (2.1 volts per cell) has a terminal voltage of 10 volts when delivering 2 amperes to a load. What is the internal resistance of the battery?

1—1.3 ohms.
2—2.6 ohms.
3—5.0 ohms.
4—6.3 ohms.

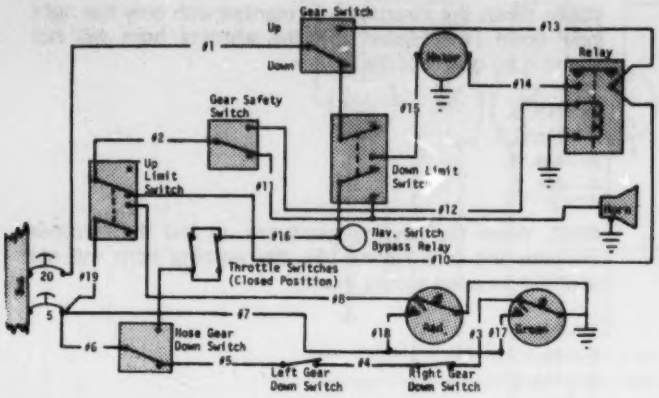

Figure 17

4072. Using Figure 17, when the landing gear is down, the green light will not come on if an open occurs in wire

1—No. 7.
2—No. 6.
3—No. 16.
4—No. 17.

4073. Which symbol in Figure 18 represents a variable resistor?

1—C.
2—A.
3—B.
4—D.

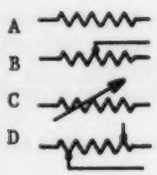

Figure 18

4074. If an inspection discloses that a considerable amount of acid from a lead–acid battery has been spilled in the general area of the battery compartment, which of the following procedures should be followed?

1—Neutralize the spilled battery acid by applying sodium bicarbonate, or sodium borate dissolved in water to the affected area followed by a water wash.
2—Apply sodium bicarbonate in powder form to the affected area.
3—Apply water to the affected area until the spilled battery acids turn a cloudy white.
4—Wipe the affected area with an oil–soaked cloth.

4075. A fully charged lead–acid battery will not freeze until extremely low temperatures are reached because

1—the acid is in the plates, thereby increasing the specific gravity of the solution.
2—most of the acid is in the solution.
3—the increased internal resistance generates sufficient heat to prevent freezing.
4—gases which act as an insulator are always present above the solution.

4076. What determines the amount of current which will flow through a battery while it is being charged by a constant voltage source?

1—The number of cells in the battery.
2—The total plate area of the battery.
3—The state of charge of the battery.
4—The ampere–hour capacity of the battery.

4077. When installing batteries on a constant–current battery charger, it is important to know that batteries of

1—more than one voltage rating may be connected in series and charged at the same time.
2—more than one voltage rating may be connected in parallel and charged at the same time.
3—only one voltage rating may be connected in series and charged at the same time.
4—only one voltage rating may be connected in parallel and charged at the same time.

4078. Aircraft batteries are usually rated according to voltage and ampere–hour capacity. A 35 ampere–hour battery rating based on the 5–hour discharge rate indicates

1—the battery will supply a current of 7 amperes for 5 hours.
2—the battery will not become discharged in less than 5 hours.
3—a battery discharge rate of 35 amperes must not be continued for more than 5 hours.
4—the battery will supply a current of 35 amperes for 5 hours.

4079. Some aircraft use more than one battery to increase the power available for starting and for operating emergency loads. How are the batteries connected so that the output power will increase but the voltage will remain the same?

1—By connecting the batteries to separate loads.
2—It is not possible.
3—By connecting the batteries in parallel.
4—By connecting the batteries in series.

4080. What is the rated voltage–per–cell of a nickel–cadmium battery?

1—1.30 volts.
2—2.00 volts.
3—2.25 volts.
4—1.55 volts.

4081. The electrolyte used in the nickel–cadmium battery is a

1—potassium hydroxide solution.
2—hydrochloric acid solution.
3—sulfuric acid solution.
4—potassium peroxide solution.

4082. Most aircraft storage batteries are rated according to

1—open–circuit voltage and closed–circuit voltage.
2—voltage and ampere hour capacity.
3—the maximum number of volt–amperes (power) the battery can furnish to a load.
4—battery voltage and volts per cell.

4083. (I) The electrolyte in a nickel–cadmium battery acts as a conductor.

(2) The electrolyte in a nickel–cadmium battery provides an insulator between the plates.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Only No. 2 is true.
3—Both No. 1 and No. 2 are true.
4—Neither No. 1 nor No. 2 is true.

4084. Which of the following is an indication of improperly torqued cell link connections of a nickel–cadmium battery?

1—Light spewing at the cell caps.
2—Low temperature in the cells.
3—Toxic and corrosive deposits of potassium carbonate crystals.
4—Heat or burn marks on the hardware.

4085. What is the most probable cause of an excessive amount of potassuim carbonate formation on a nickel–cadmium battery?

1—Battery overcharging.
2—Good battery ventilation.
3—Diluted electrolyte solution.
4—High internal resistance in the battery.

4086. When should water be added to a nickel–cadmium battery?

1—3 to 4 hours after the charging cycle is completed.
2—Before starting the charging cycle.
3—During the charging cycle.
4—Immediately after the charging cycle is completed.

4087. The electrolyte of a nickel–cadmium battery is the lowest when

1—the battery is being charged.
2—the battery is fully charged.
3—the battery is in a discharged condition.
4—the battery is under load condition.

4088. What is the cell voltage of a fully charged 19 cell, nickel–cadmium battery?

1—1.2 to 1.3 volts.
2—1.4 to 1.5 volts.
3—1.7 to 1.8 volts.
4—1.8 to 1.9 volts.

4089. Nickel–cadmium batteries which are stored for a long period of time will show a low fluid level because the

1—fluid evaporates through the vents.
2—battery is fully charged.
3—fluid level was not periodically replenished.
4—electrolyte becomes absorbed in the plates.

4090. How can the state–of–charge of a nickel–cadmium battery be determined?

1—By measuring the specific gravity of the electrolyte.
2—By a measured discharge.
3—By the temperature of the plates.
4—By the level of the electrolyte.

4091. Which of the following may result if water is added to a nickel–cadmium battery when it is not fully charged?

1—The cell temperatures will run too low for proper output.
2—The electrolyte will be absorbed by the plates during the charging cycle.
3—No adverse results since water may be added anytime.
4—Excessive spewing will occur during the charging cycle.

4092. Overcharging of nickel–cadmium batteries causes

1—excessive wetness around the cells, connectors, and cases.
2—consistently low electrolyte level.
3—formation of an excessive amount of potassium carbonate.
4—excessive plate sulfation.

4093. What type of line is normally used in a mechanical drawing or blueprint to represent an edge or object not visible to the viewer?

1—Medium–weight dashed line.
2—Light solid line.
3—Alternate short and long heavy dashes.
4—Zigzag or wavy line.

4094. A line used to divide a drawing into equal or symmetrical parts is a

1—center line.
2—section line.
3—extension line.
4—cutting plane line.

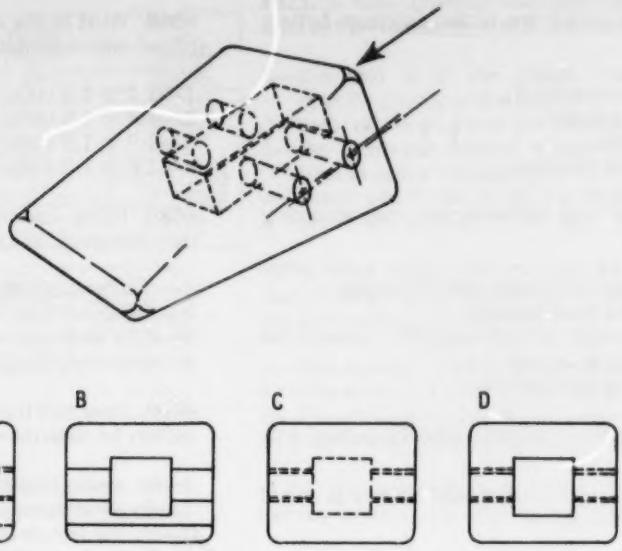

Figure 19

4095. In the isometric view (see Figure 19) of a typical aileron balance weight, identify the view indicated by the arrow.

1—A.
2—B.
3—D.
4—C.

4096. Schematic diagrams

1—indicate the location of individual components in the aircraft.
2—do not give individual component location in the aircraft.
3—do not locate components within the system.
4—are used to locate parts and assemblies of parts for installation in aircraft.

4097. (1) A detail drawing is a description of a single part.

(2) An assembly drawing is a description of an object made up of two or more parts.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Only No. 2 is true.
3—Neither No. 1 nor No. 2 is true.
4—Both No. 1 and No. 2 are true.

4098. Identify the bottom view of the object shown in Figure 20.

1—A.
2—C.
3—B.
4—D.

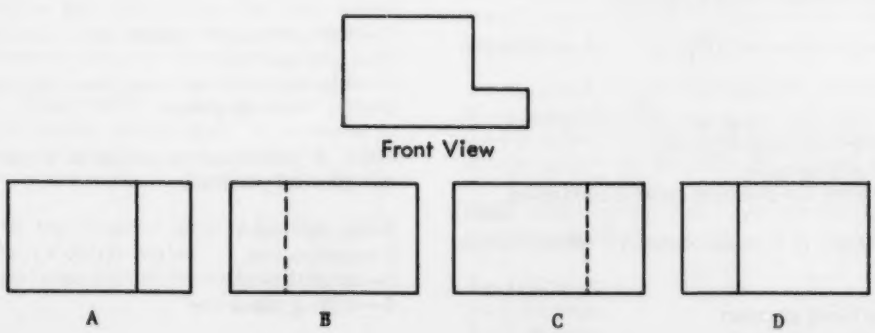

Figure 20

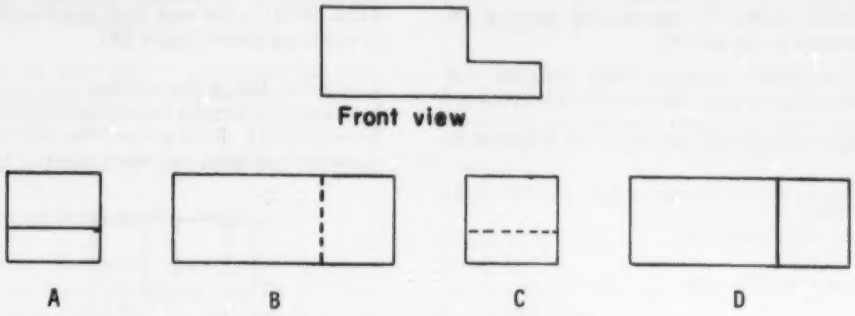

Figure 21

4099. What is a fuselage station number?

1—A measurement in inches from the datum or some other point chosen by the manufacturer.
2—A zone number used to locate a particular point.
3—A measurement in inches from the centerline or zero station of the aircraft.
4—A measurement in inches which always starts at the nose of the aircraft.

4100. What type of line is normally used in a mechanical drawing to represent the exposed surfaces of an object in sectional view?

1—Sectioning line.
2—Leader line.
3—Break line.
4—Outline or visible line.

4101. How many views are possible with an orthographic projection?

1—Four.
2—Six.
3—Three.
4—Five.

4102. In an orthographic projection, which of the following is true?

1—There are always at least two views.
2—It could have as many as eight views.
3—It must be accompanied with a pictorial drawing.
4—One-view, two-view, and three-view drawings are the most common.

4103. Identify the left side view of the object shown in Figure 21.

1—A.
2—B.
3—C.
4—D.

4104. Where is the title block usually located on a drawing?

1—Lower right corner.
2—Lower left corner.
3—Upper right corner.
4—Upper left corner.

4105. A line used to show an edge which is not visible is a

1—position line.
2—phantom line.
3—hidden line.
4—break line.

4106. Identify the bottom view of the object in Figure 22.

1—B.
2—A.
3—C.
4—D.

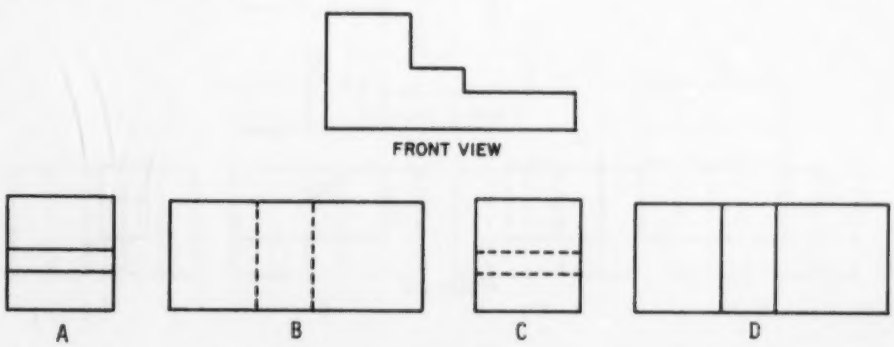

Figure 22

4107. (1) Schematic diagrams indicate the location of individual components in the aircraft.

(2) Schematic diagrams indicate the location of components with respect to each other within the system.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Both No. 1 and No. 2 are true.
3—Only No. 2 is true.
4—Neither No. 1 nor No. 2 is true.

4108. Identify the phantom line used in aircraft drawings.

1— ——— — ——— — ——— — ——— —
2— — — — — — — — — — — — —
3— ——— — — ——— — — ——— — —
4— —— —— —— —— —— —— —— ——

4109. Which of the following is used extensively in all aircraft maintenance and repair manuals and are invaluable in identifying and locating components and understanding the operation of various systems?

1—Drawing sketches.
2—Pictorial drawings.
3—Assembly drawings.
4—Installation diagrams.

4110. What are the proper procedural steps for sketching repairs and alterations? (See Figure 23.)

1—C, A, D, B.
2—B, C, A, D.
3—D, B, C, A.
4—A, C, D, B.

4111. What is the next step required for a working sketch of the illustration, Figure 24?

1—Darken the object outlines.
2—Sketch extension and dimension lines.
3—Add notes, dimensions, title, and date.
4—Sketch at least two more views of the object.

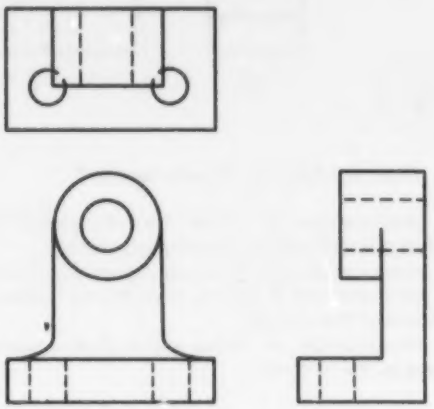

Figure 24

4112. When an aircraft drawing contains three separate views, the drawing is known as

1—separate view projection.
2—side-view drawing.
3—an isometric three-view.
4—an orthographic projection.

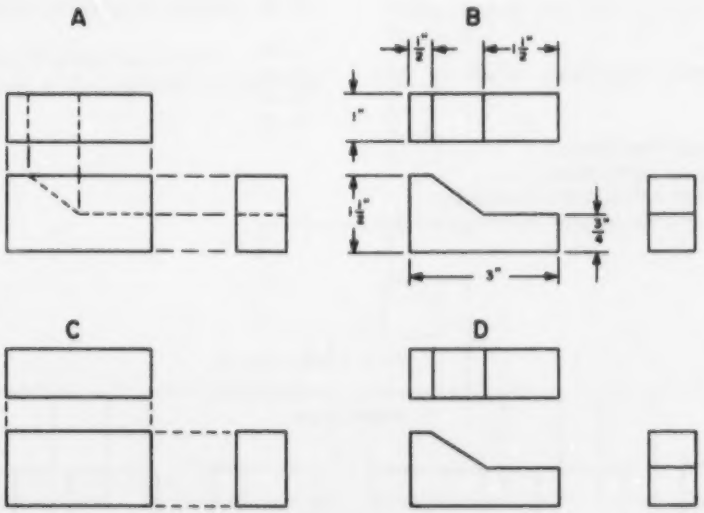

Figure 23

4113. Which of the following statements is applicable when using a sketch for making a part?

1—The sketch may be used only if supplemented with three-view orthographic projection drawings.
2—The sketch must show all information to manufacture the part.
3—The sketch need not show all necessary construction details.
4—A part is never made solely from a sketch.

4114. In orthographic projection drawings, it is often possible to portray an object clearly by the use of three views. When three-view projection is used, which of the following views are usually shown?

1—Top, front, and bottom.
2—Front, left side, and right side.
3—Top, front, and right side.
4—Front, back, and left side.

4115. What should be the first step of the procedure in sketching an aircraft wing skin repair?

1—Draw heavy guidelines.
2—Layout the repair.
3—Draw the details.
4—Block in the views.

4116. (1) According to FAR Part 91, repairs to an aircraft skin should have a detailed dimensional sketch included in the permanent records.

(2) On occasion, a mechanic may need to make a simple sketch of a proposed repair to an aircraft, a new design, or a modification.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Only No. 2 is true.
3—Both No. 1 and No. 2 are true.
4—Neither No. 1 nor No. 2 is true.

4117. What are the six possible views of an object in orthographic projection?

1—Front, top, inside, rear, right side, and left side.
2—Front, outside, bottom, rear, right side, and left side.
3—Front, top, bottom, rear, right side, and left side.
4—Front, top, bottom, inside, right side, and left side.

4118. What is the dimension of the chamfer in Figure 25?

1—0.0625 X 45°.
2—0.0625 R.
3—0.4062 R spherical.
4—0.5000 diameter.

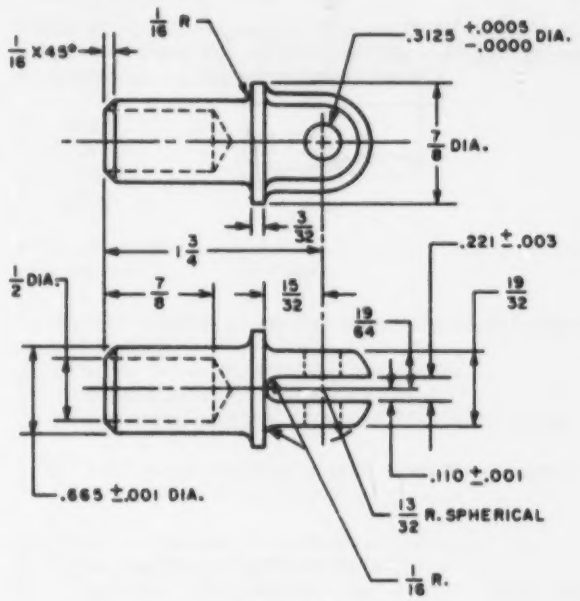

Figure 25

4119. Identify the bottom view of the object shown in Figure 26.

1—A.
2—B.
3—C.
4—D.

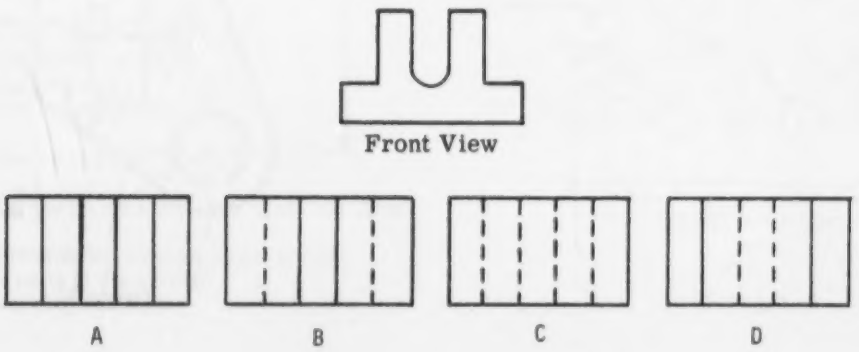

Figure 26

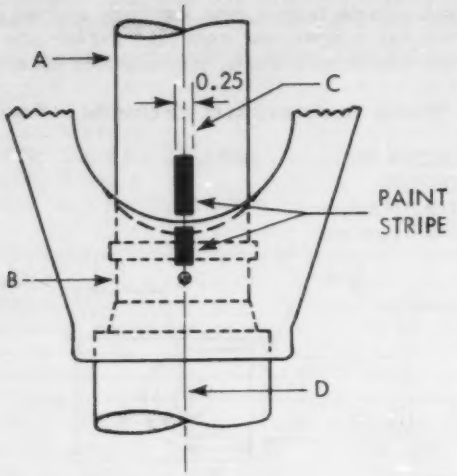

Figure 27

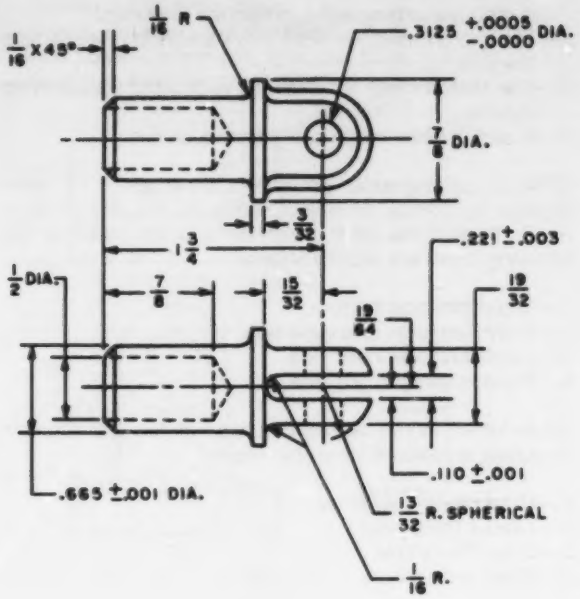

Figure 29

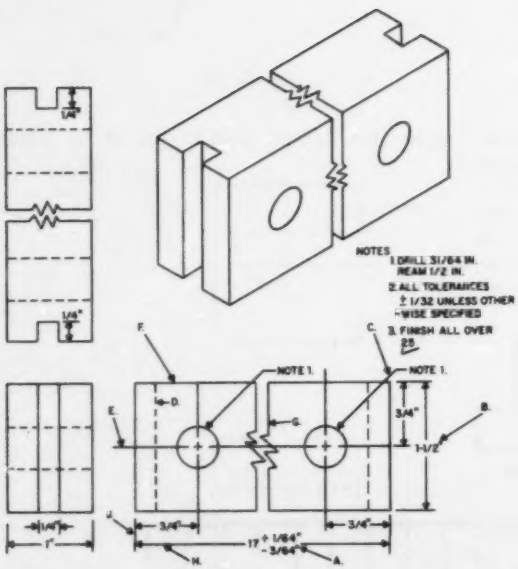

Figure 28

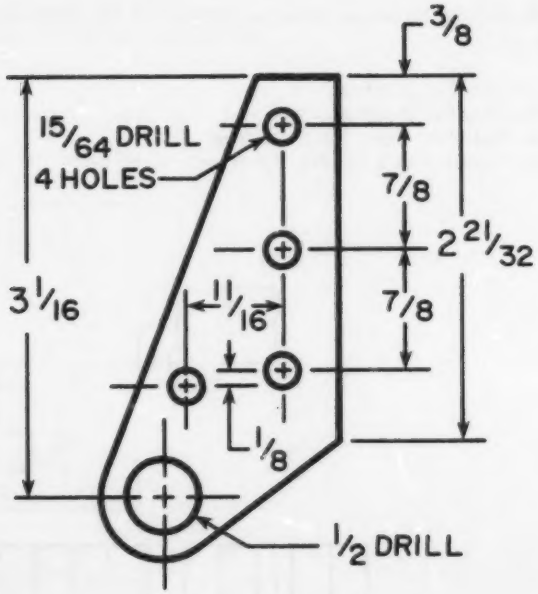

Figure 30

4120. What are the means of conveying measurements through the medium of drawings?

1—Dimensions.
2—Tolerances.
3—Edge distances.
4—Bend allowances.

4121. Identify the extension line in Figure 27.

1—C.
2—A.
3—B.
4—D.

4122. The diameter of the holes in the finished object of Figure 28 is

1—3/4 inch.
2—31/64 inch.
3—1 inch.
4—1/2 inch.

4123. What is the maximum diameter of the hole for the clevis pin in Figure 29?

1—0.500.
2—0.3125.
3—0.3130.
4—0.31255.

4124. What would be the minimum diameter of 4130 round stock required for the construction of the clevis in Figure 29 that would produce a machined surface?

1—55/64 inch.
2—1 inch.
3—7/8 inch.
4—1-1/16 inch.

4125. Using the information in Figure 29, what size drill would be required to drill the clevis bolthole?

1—21/64 inch.
2—19/64 inch.
3—5/16 inch.
4—9/32 inch.

4126. The purpose of cross-hatching in a drawing is to show

1—the thickness of material used.
2—the type of construction employed.
3—the method of finishing.
4—the cross-section of an object.

4127. Zone numbers on aircraft blueprints are

1—used to locate parts, sections, and views on large drawings.
2—used to indicate different sections of the aircraft.
3—used to locate parts in the aircraft.
4—not used on working drawings.

4128. Schematic diagrams are used for

1—locating components in the aircraft.
2—trouble-shooting.
3—identifying items in the aircraft.
4—manufacturing aircraft parts.

4129. When reading a blueprint, a dimension is given as 4.387" + .005, – .002. Which of the following is true?

1—The maximum acceptable size is 4.389".
2—The tolerance is .007.
3—The maximum acceptable size is 4.385".
4—The minimum acceptable size is 4.387".

4130. What is the allowable manufacturing tolerance for a bushing where the outside dimensions shown on the blueprint are: 1.0625 +.0025, –.0003?

1—.0028.
2—1.0650.
3—1.0647.
4—.0025.

4131. A hydraulic system schematic drawing would indicate the

1—specific location of the individual components within the aircraft.
2—direction of fluid flow through the system.
3—type and quantity of the hydraulic fluid.
4—part or model numbers of the individual components.

4132. What is the meaning of print tolerance as used in the title block of an aircraft blueprint?

1—Describes the size of the blueprint paper.
2—Shows proprietary rights of the blueprint.
3—Establishes the tolerance for a part when not otherwise shown by a dimension line.
4—Overrides any other dimension that may be shown on the blueprint.

4133. In Figure 30 the vertical distance between the top of the plate and the bottom of the lowest 15/64" hole is

1—2.250.
2—2.242.
3—2.367.
4—3.312.

4134. Determine the engine speed (RPM) necessary to develop 850 brake horsepower in a 2,000 cubic inch displacement aircraft reciprocating engine operating at 185 BMEP. (See Figure 31.)

1—1,800.
2—1,200.
3—1,400.
4—1,600.

4135. An aircraft reciprocating engine has 1,830 cubic inch displacement, develops 1,250 brake horsepower at 2,500 RPM. What is the brake mean effective pressure? (See Figure 31.)

1—217.
2—190.
3—205.
4—225.

4136. An aircraft reciprocating engine has 2,800 cubic inch displacement, develops 2,000 brake horsepower, and indicates 270 brake mean effective pressure. What is the engine speed (RPM)? (Use Figure 31.)

1—2,200.
2—2,100.
3—2,300.
4—2,400.

4137. Using Figure 32, determine the cable size of a 40–foot length of single cable in free air with a continuous rating, running from a bus to the equipment in a 28–volt system with a 15–ampere load and a 1–volt drop.

1—No. 10.
2—No. 11.
3—No. 18.
4—No. 6.

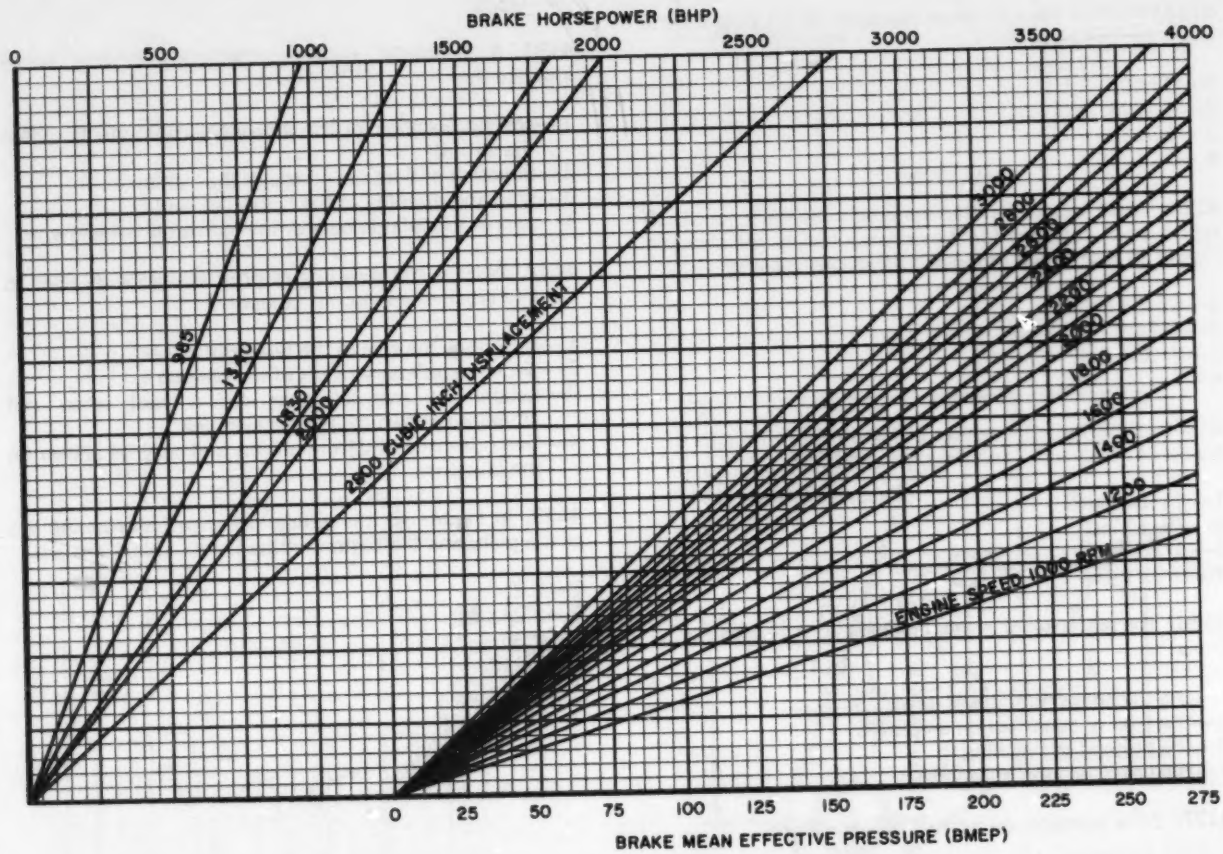

Figure 31

4138. Using Figure 32, determine the smallest size wire acceptable for carrying 80 amperes of continuous current using a single wire in free air.

1—No. 2.
2—No. 8.
3—No. 6.
4—No. 4.

4139. Using Figure 32, determine the maximum length of a No. 14 single wire in free air, running from a bus to the equipment in a 28–volt system with a 30–ampere continuous load and a 1–volt drop.

1—11 feet.
2—9 feet.
3—13 feet.
4—15 feet.

4140. Using Figure 32, determine the minimum wire size of a 15–foot length of single cable in a bundle supplying current to a component rated at 14 volts, with a 20–ampere load and an allowable .5–volt drop.

1—No. 12.
2—No. 10.
3—No. 16.
4—No. 18.

4141. Determine the minimum wire size of a single cable in a bundle carrying a continuous current of 20 amperes 10 feet from the bus to the equipment in a 28–volt system with an allowable 1–volt drop. (See Figure 32.)

1—No. 12.
2—No. 14.
3—No. 16.
4—No. 18.

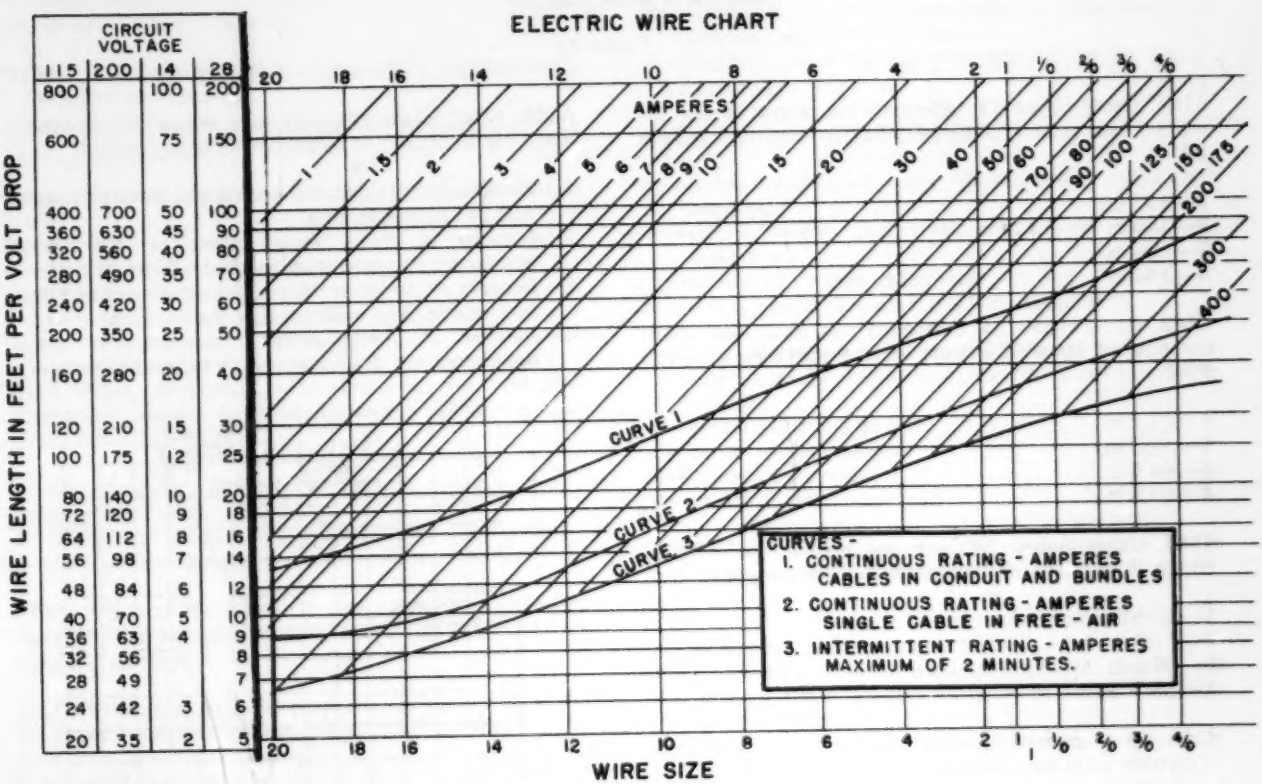

Figure 32

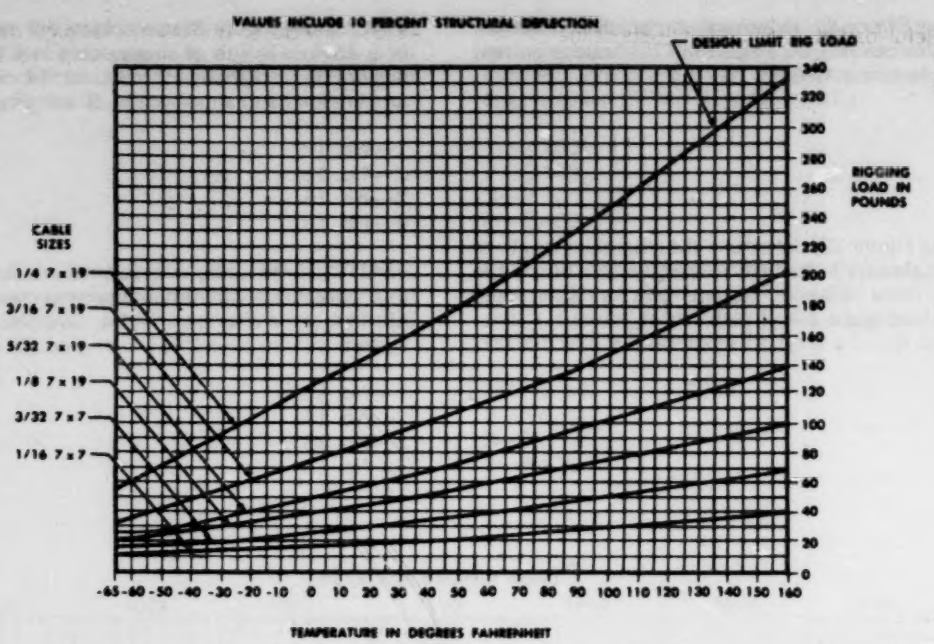

Figure 33

4142. Using Figure 33, determine the proper tension for a 3/16-inch cable (7 X 19 extra flex) if the temperature is 87° F.

1—132 lb.
2—140 lb.
3—136 lb.
4—144 lb.

4143. Using Figure 34, determine how much fuel would be required for a 30-minute reserve operating at 2,300 RPM.

1—25.7 lb.
2—22.3 lb.
3—44.6 lb.
4—49.8 lb.

4144. Using Figure 34, with the engine operating at cruise, 2,350 RPM, determine the fuel consumption.

1—49.5 lb./hr.
2—51.5 lb./hr.
3—55.5 lb./hr.
4—58.7 lb./hr.

4145. When computing weight and balance, an airplane is considered to be in balance when

1—all moment arms of the plane fall within CG range.
2—the movement of the passengers will not cause the moment arms to fall outside the CG range.
3—the pilot is able to compensate for unbalance by use of elevator trim.
4—the average moment arm of the loaded airplane falls within its CG range.

4146. Which of the following tasks are completed prior to weighing an aircraft to determine its empty weight?

1—Remove all items on the aircraft equipment list; drain fuel and hydraulic fluid.
2—Remove all items except those on the aircraft equipment list; drain fuel and hydraulic fluid.
3—Remove all items on the aircraft equipment list; drain fuel, compute oil and hydraulic fluid weight.
4—Remove all items except those on the aircraft equipment list; drain fuel and fill hydraulic reservoir.

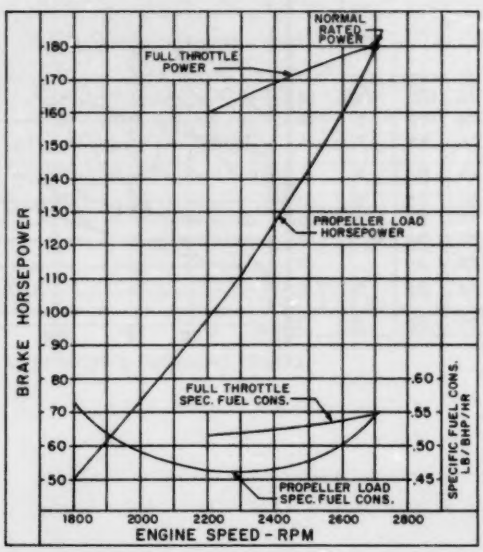

Figure 34

4147. The useful load of an aircraft consists of the

1—crew, fuel, passengers, and cargo.
2—crew, fuel, oil, and fixed equipment.
3—crew, passengers, fuel, oil, cargo, and fixed equipment.
4—crew, powerplant, fuel, oil, cargo, and passengers.

4148. Before weighing an aircraft, it is necessary to become familiar with the aircraft empty weight and CG range in the weight and balance information in

1—the particular aircraft's weight and balance records.
2—Advisory Circular 43.13–1A, Chapter 12.
3—the applicable Aircraft Specification or Type Certificate Data Sheet.
4—the manufacturer's service bulletins and letters.

4149. When preparing an aircraft for weighing, which of the following should be filled unless otherwise noted in the aircraft specifications or manufacturer's instructions?

1—Hydraulic reservoirs.
2—Lavatory tanks.
3—Wash water reservoirs.
4—Drinking water reservoirs.

4150. (1) Private aircraft are required by regulations to be weighed periodically.

(2) Private aircraft are required to be weighed after making any alteration.

Regarding the above statements, which of the following is true?

1—Neither No. 1 nor No. 2 is true.
2—Only No. 1 is true.
3—Only No. 2 is true.
4—Both No. 1 and No. 2 are true.

4151. What document will reference the required equipment needed to maintain validity of a standard airworthiness certificate?

1—Manufacturer's Maintenance Manual.
2—Advisory Circular 43.13–1A.
3—The aircraft's latest weight and balance information.
4—Aircraft Specification or Type Certificate Data Sheet.

4152. Which of the following designates the location of the reference points for leveling aircraft on the ground for weighing purposes?

1—Certificated A and P mechanic.
2—Federal Aviation Administrator.
3—Certificated repair station.
4—Aircraft manufacturer.

4153. To obtain useful weight data for purposes of determining the center of gravity, it is necessary that an aircraft be weighed

1—with the main weighing points located within the normal CG limits.
2—in a level flight attitude.
3—with all items of useful load installed.
4—with at least minimum fuel (1/12-gallon per METO horsepower) in the fuel tanks.

4154. What unit of measurement is used to designate moment arm in weight and balance computation?

1—Pound/feet.
2—Inches.
3—Feet.
4—Pound/inches.

4155. What determines whether the value of the moment is preceded by a plus (+) or a minus (–) sign in aircraft weight and balance?

1—The addition or removal of weight.
2—The location of the weight in reference to the datum.
3—The result of a weight being added or removed and its location relative to the datum.
4—The location of the datum in reference to the aircraft center of gravity.

4156. The maximum weight of an aircraft is the

1—empty weight plus crew, maximum fuel, cargo, and baggage.
2—empty weight plus crew, passengers, and fixed equipment.
3—empty weight plus useful load.
4—empty weight plus crew and fixed equipment.

4157. In the theory of weight and balance, the influence of weight is directly dependent upon its distance from the

1—centerline of the aircraft.
2—center of the fuselage.
3—center of gravity.
4—center of longitudinal axis.

4158. When computing weight and balance for a helicopter, you must consider that

1—the flight altitudes of a helicopter are such that the weight and balance is not critical.
2—it is different from a fixed-wing aircraft, because the whirling rotor makes it difficult to locate the mean aerodynamic chord.
3—the arm of tail-mounted components is subject to constant change.
4—it is computed the same as a fixed-wing aircraft.

4159. Which of the following should be clearly indicated on the aircraft weighing form?

1—Minimum allowable gross weight.
2—Weight of unusable fuel.
3—Weighing points.
4—Zero fuel weight.

4160. The reference datum line is usually placed forward of the nose of the aircraft because

1—this is the only location from which all arms can be measured.
2—all manufacturers have agreed on this point for purposes of standardization.
3—all measurements will be positive numbers, contributing to accuracy.
4—measurement of arms from the nose involves less movement of cargo.

4161. Zero fuel weight is the

1—basic operating weight plus the weight of full passengers and cargo.
2—maximum weight of a loaded airplane less fuel located in the wings.
3—gross weight plus fuel, passengers, and cargo.
4—basic weight plus the weight of items such as oil, crew, and crew's baggage.

4162. The empty weight of an airplane is determined by

1—adding the gross weight on each weighing point and multiplying by the measured distance to the datum.
2—adding the net weight of each weighing point and multiplying the measured distance to the datum.
3—subtracting the tare weight from the scale reading and adding the weight of each weighing point.
4—multiplying the measured distance from each weighing point to the datum times the sum of scale reading less the tare weight.

4163. When dealing with weight and balance of an aircraft, the term maximum weight is interpreted to mean the maximum

1—weight of the empty aircraft.
2—weight of the useful load.
3—authorized weight of the aircraft and its contents.
4—weight of all optional or special equipment that can be installed in the aircraft.

4164. The most important reason for aircraft weight and balance control in today's aircraft is

1—efficiency in flight.
2—to reduce noise levels.
3—safety.
4—to increase payloads.

4165. An aircraft has an empty weight of 2,886 pounds and a total moment of 107,865.78 inch-pounds. The following modifications were made: two seats weighing 15 pounds each were removed from station 73 and replaced with a cabinet weighing 97 pounds; one seat weighing 20 pounds was installed at station 73; communication gear weighing 30 pounds was installed at station 97. The new empty weight center of gravity is located

1—1.63 inches forward of the old CG.
2—2.05 inches forward of the old CG.
3—1.63 inches aft of the old CG.
4—2.05 inches aft of the old CG.

4166. When determining the empty weight of an aircraft, certificated under current airworthiness standards (FAR Part 23), the oil contained in the supply tank is considered

1—a part of the empty weight.
2—a part of the useful load.
3—the same as the fluid contained in the water injection reservoir.
4—a part of the payload.

4167. Improper loading of a helicopter which results in exceeding either the fore or aft center of gravity limits is hazardous due to the

1—reduction or loss of effective cyclic pitch control.
2—override feature of the sprag clutch assembly.
3—Coriolis effect being translated to the fuselage.
4—reduction or loss of effective collective pitch control.

4168. How is the useful load of an aircraft determined?

1—Subtract the empty weight from the maximum allowable gross weight.
2—Add the empty weight and maximum allowable gross weight.
3—Subtract the tare weight from the empty weight.
4—Multiply the total moment by the empty weight.

4169. The maximum weight as used in weight and balance control of a given aircraft, can normally be found

1—in the back of the aircraft logbook.
2—by weighing the aircraft to obtain empty weight and mathematically adding the weight of fuel, oil, pilot, passengers, and baggage.
3—in the Aircraft Specifications or Type Certificate Data Sheets.
4—by adding the empty weight and payload.

4170. An aircraft with an empty weight of 2,100 pounds and an empty weight center of gravity of +32.5 was altered as follows:

(1) two 18-pound passenger seats located at +73 were removed;
(2) structural modifications were made at +77 increasing weight by 17 pounds;
(3) a seat and safety belt weighing 25 pounds were installed at +74.5; and
(4) radio equipment weighing 35 pounds was installed at +95.

What is the new empty weight center of gravity?

1—+30.44.
2—+34.01.
3—+33.68.
4—+34.65.

4171. The amount of fuel used for computing empty weight and corresponding center of gravity is

1—empty fuel tanks.
2—unusable fuel.
3—full fuel tanks.
4—the amount of fuel necessary for 1/2 hour of operation.

4172. An aircraft as loaded weighs 4,954 pounds at a center of gravity of +30.5 inches. The center-of-gravity range is +32.0 inches to +42.1 inches. Find the minimum weight of the ballast necessary to bring the center of gravity within the center-of-gravity range. The ballast arm is +162 inches.

1—61.98 lb.
2—30.58 lb.
3—46.24 lb.
4—57.16 lb.

4173. As weighed, the total empty weight of an aircraft is 5,862 pounds with a moment of 885,957. However, when the aircraft was weighed, 20 pounds of alcohol were on board at +84, and 23 pounds of hydraulic fluid were in a tank located at +101. What is the empty weight CG of the aircraft?

1—150.700.
2—151.700.
3—154.200.
4—151.365.

4174. Two boxes which weigh 10 pounds and 5 pounds are placed in an airplane so that their distance aft from the center of gravity are 4 feet and 2 feet respectively. How far forward of the center of gravity should a third box, weighing 20 pounds, be placed so that the center of gravity will not be changed?

1—3 feet.
2—2.5 feet.
3—6 feet.
4—8 feet.

4175. When the empty weight center of gravity of an aircraft falls within the empty weight center-of-gravity range listed in the Aircraft Specifications or Type Certificate Data Sheet, the

1—critical fore-and-aft-loaded center-of-gravity positions computations are unnecessary.
2—aircraft must be loaded in accordance with nonstandard arrangements.
3—critical forward-loaded center-of-gravity position must be computed.
4—critical rearward-loaded center-of-gravity position must be computed.

4176. An aircraft with an empty weight of 1,800 pounds and an empty weight center of gravity of +31.5 was altered as follows:

(1) two 15-pound passenger seats located at +72 were removed;
(2) structural modifications increasing the weight 14 pounds were made at +76;
(3) a seat and safety belt weighing 20 pounds were installed at +73.5; and
(4) radio equipment weighing 30 pounds was installed at +30.

What is the new empty weight center of gravity?

1—+30.61.
2—+35.04.
3—+31.61.
4—+32.69.

4177.

Datum is forward of the main gear center point	30.24".
Actual distance between tail gear and main gear center points	360.26".
Net weight at right main gear	9,980 lb.
Net weight at left main gear	9,770 lb.
Net weight at tail gear	1,970 lb.

The following items were in the aircraft when weighed:

a. Lavatory water tank full (34 lb. at +352).
b. Hydraulic fluid (22 lb. at −8).
c. Removable ballast (146 lb. at +380).

What is the empty weight CG of the aircraft described above?

1—62.92 inches.
2—60.31 inches.
3—58.54 inches.
4—59.50 inches.

4178. When making a rearward weight and balance check to determine that the CG will not exceed the rearward limit during extreme conditions, the items of useful load which should be computed at their minimum weights are those located forward of the

1—forward CG limit.
2—empty weight CG.
3—datum.
4—rearward CG limit.

4179. When an empty aircraft is weighed, the combined net weight at the main gears is 3,540 pounds with an arm of 195.5 inches. At the nose gear, the net weight is 2,322 pounds with an arm of 83.5 inches. The datum line is forward of the nose of the aircraft. What is the empty CG of the aircraft?

1—151.1.
2—158.7.
3—155.2.
4—146.5.

4180. An aircraft with an empty weight of 1,500 pounds and an empty weight center of gravity of +28.4 was altered as follows:

(1) two 12-pound seats located at +68.5 were removed;
(2) structural modifications weighing +28 pounds were made at +73;
(3) a seat and safety belt weighing 30 pounds were installed at +70.5; and
(4) radio equipment weighing 25 pounds was installed at +85.

What is the new empty weight center of gravity?

1—+23.51.
2—+30.81.
3—+31.35.
4—+30.30.

4181. The following alteration was performed on an aircraft: A model B engine weighing 175 pounds was replaced by a model D engine weighing 185 pounds at a −62.00" station. The aircraft weight and balance records show the previous empty weight to be 998 pounds and an empty weight center of gravity of 13.48". What is the new empty weight center of gravity?

1—12.99 inches.
2—13.96 inches.
3—14.25 inches.
4—12.73 inches.

4182. When computing the maximum forward loaded center of gravity of an aircraft, minimum weights, arms, and moments should be used for items of useful load that are located aft of the

1—rearward CG limit.
2—forward CG limit.
3—datum.
4—empty weight CG.

4183. An aircraft with an empty weight of 1,800 pounds and an empty weight center of gravity of +31.5 was altered as follows:

(1) two 15-pound passenger seats located at +50 were removed;
(2) structural modifications increasing the weight 14 pounds were made at +76;
(3) a seat and safety belt weighing 20 pounds were installed at +73.5; and
(4) radio equipment weighing 30 pounds was installed at +30.

What is the new empty weight center of gravity?

1—+31.97.
2—+31.67.
3—+32.69.
4—+33.95.

4184. Find the empty weight center-of-gravity location for the following tricycle gear aircraft. Each main wheel weighs 753 pounds, nosewheel weighs 22 pounds, distance between nosewheel and main wheels is 87.5 inches, nosewheel location is +9.875 inches from datum, with 1 gallon of hydraulic fluid at −21.0 inches included in the weight scale.

1—+97.375 inches.
2—+94.89 inches.
3—+95.61 inches.
4—+96.11 inches.

4185. Which coupling nut should be selected for use with 1/2-inch aluminum oil lines which are to be assembled using flared tube ends and standard AN nuts, sleeves, and fittings?

1—AN-818-2.
2—AN-818-8.
3—AN-818-5.
4—AN-818-12.

4186. Hydraulic lines located in entryways or passenger, crew, or baggage compartments

1—should be suitably supported and protected against physical damage.
2—are not normally permitted.
3—must be routed in separate enclosures which must be drained and vented to the outside atmosphere.
4—must not contain any fittings or connections within the entryways or compartments.

4187. From the following sequences of steps, indicate the proper order you would use to make a single flare on a piece of tubing:

A. Place the tube in the proper size hole in the flaring block.
B. Project the end of the tube slightly from the top of the flaring tool, about the thickness of a dime.
C. Slip the fitting nut and sleeve on the tube.
D. Strike the plunger several light blows with a light weight hammer or mallet and turn the plunger one-half turn after each blow.
E. Tighten the clamp bar securely to prevent slippage.
F. Center the plunger or flaring pin over the tube.

1—F, E, B, A, D, C.
2—A, C, E, B, D, F.
3—C, A, F, B, E, D.
4—C, B, F, E, A, D.

4188. High-pressure hydraulic tubing which is damaged in a localized area to such extent that repair is necessary, may be repaired

1—with a union and two sets of connecting fittings.
2—only by replacing the entire tubing using the same size and material as the original.
3—by cutting out the damaged section of tubing and installing a short piece of high-pressure flexible hose with hose clamps.
4—by cutting out the damaged section and welding in a replacement section of tubing.

4189. What is an advantage of a double flare on aluminum tubing?

1—It is less concentric than a single flare.
2—Ease of construction.
3—It is less resistant to the shearing effect of torque.
4—It is more resistant to the shearing effect of torque.

4190. If failure of a flexible hydraulic hose equipped with swaged end fittings occurs, which of the following repair procedures should be followed?

1—Insert a nonmetallic hose liner which is approved for use with the type of fluid contained in the system and clamp firmly at both ends.
2—Remove the hose fittings and reuse on a new flexible line of the correct length.
3—Replace the hose with rigid tubing equipped with end fittings of the same type as those used in other parts of the system.
4—Install a replacement hose of the proper length which has been factory equipped with swaged end fittings.

4191. Select the correct statement in reference to flare fittings.

1—AN fittings can easily be identified by the shoulder between the end of the threads and the flare cone.
2—All parts of the AN fitting assemblies are interchangeable with AC fitting assemblies with the exception of the sleeves.
3—AC and AN fittings are identical except for the material from which they are made and the identifying color.
4—AC fittings have generally replaced the older AN fittings.

4192. Flexible lines should be installed

1—where bends are necessary.
2—only aft of the firewall.
3—with just enough slack to make the connection.
4—with 5 – 8 percent slack.

4193. The maximum distance between end fittings to which a straight hose assembly is to be connected is 50 inches. The minimum hose length to make such a connection should be

1—54–1/2 inches.
2—50–3/4 inches.
3—51 inches.
4—52–1/2 inches.

4194. How should a flexible hose be installed?

1—Stretched tightly between two fittings.
2—With slack or bend in the hose.
3—With as small a bend radius as possible.
4—To allow maximum flexing during operation.

4195. Which of the following colors identifies an AN aluminum flared-tube fitting?

1—Green.
2—Black.
3—Red.
4—Blue.

4196. Soft aluminum tubing (1100, 3003, or 5052) may be bent by hand if the size is

1—5/16 inch or less.
2—7/16 inch or less.
3—5/8 inch or less.
4—1/4 inch or less.

4197. The material specifications for a certain aircraft require that a replacement oil line be fabricated from 3/4-inch, 0.072 5052-0 aluminum alloy tubing. What is the inside dimension of this tubing?

1—0.606 inch.
2—0.572 inch.
3—0.688 inch.
4—0.750 inch.

4198. In most aircraft hydraulic systems, two-piece tube connectors consisting of a sleeve and a nut are used when a tubing flare is required. The use of this type connector eliminates

1—the need for flexible lines interconnecting movable and stationary components.
2—the flaring operation prior to assembly.
3—the possibility of reducing the flare thickness by wiping or ironing during the tightening process.
4—wrench damage to the tubing during the tightening process.

4199. Which of the following statements about MS (Military Standard) flareless fittings is correct?

1—MS flareless fitting sleeves must not be preset on the line prior to final assembly.
2—During installation, MS flareless fittings are normally tightened by turning the nut a specified amount after the sleeve and fitting sealing surface have made contact, rather than being torqued.
3—MS flareless fittings should not be lubricated prior to assembly.
4—MS flareless fittings must be tightened to a specific torque.

4200. When flaring aluminum tubing for use with AN coupling nuts and sleeves, the flare angle should be

1—30°.
2—37°.
3—67°.
4—45°.

4201. Scratches or nicks on the straight portion of aluminum alloy tubing may be repaired if they are no deeper than

1—20 percent of the wall thickness.
2—1/32 inch.
3—1/16 inch.
4—10 percent of the wall thickness.

4202. Which of the following is used in aircraft plumbing to connect moving parts with stationary parts in locations subject to vibration?

1—Flexible aluminum tubing.
2—Corrosion-resistant steel tubing.
3—Thin-wall aluminum tubing.
4—Flexible hose.

4203. If it is necessary to route hydraulic lines and electrical power cables adjacent to each other, the electrical cable should be

1—routed below the hydraulic line and clamped securely to the structure.
2—routed above the hydraulic line and clamped securely to the structure.
3—attached securely to the line by clamps that will maintain a separation between the line and cable equal to at least four times the diameter of the fluid line.
4—grounded at intervals not to exceed four times the distance separating the fluid line and the cable.

4204. When installing a hydraulic line, the tube flare should meet the fitting squarely and fully before starting the nut. The flare should never be drawn to the fitting with the nut because this may

1—deform the line.
2—strip the threads on the fitting.
3—deform the flare.
4—strip the threads on the nut.

4205. Flexible hose used in aircraft plumbing is classified in size according to the

1—outside diameter.
2—cross-sectional area.
3—wall thickness.
4—inside diameter.

4206. A scratch or nick in aluminum alloy tubing can be repaired by burnishing provided the scratch or nick does not

1—exceed 5 percent of the tube diameter.
2—appear in the heel of a bend in the tube.
3—exceed 20 percent of the wall thickness of the tube.
4—exceed 10 percent of the tube diameter.

4207. Which of the following tubings has the characteristics (medium strength, workability) necessary for use in a medium-pressure (1,500 PSI) hydraulic system?

1—2024T or 5052-0 aluminum alloy.
2—Copper or hard plastic.
3—1100-1/2H or 3003-1/2H aluminum alloy.
4—Carbon steel or chrome molybdenum.

4208. Which of the following tubings has the characteristics (high strength, abrasion resistance) necessary for use in a high-pressure (3,000 PSI) hydraulic system for operation of landing gear and flaps?

1—Copper or hard plastic.
2—2024-T or 5052-0 aluminum alloy.
3—Corrosion-resistant steel annealed or 1/4H.
4—1100-1/2H or 3003-1/2H aluminum alloy.

4209. When installing bonded clamps to support metal tubing,

1—paint removal from tube is unnecessary as it will inhibit corrosion.
2—paint clamp and tube after clamp installation for slippage identification.
3—paint clamp and tube after clamp installation to prevent corrosion.
4—remove paint or anodizing from tube at clamp location.

4210. In a metal tubing installation,

1—rigid straight line runs are preferable.
2—tension is undesirable because pressurization will cause it to expand and shift.
3—a tube may be pulled in line if nut will start on threaded coupling.
4—tension is desirable because it cannot shift when pressurized.

4211. A fluid line marked with the letters PHDAN

1—carries hydraulic fluid back to the reservoir.
2—is a high-pressure fluid line. The letters mean Pressure High, Discharge at Nacelle.
3—is carrying a fluid which may be dangerous to personnel.
4—must be made of a nonphosphorous metal.

4212. The principal advantage of Teflon hose is

1—its operating strength.
2—its low cost.
3—its corrosion resistance.
4—its flexibility.

4213. Which of the following statements concerning Bernoulli's principle is true?

1—The pressure of a fluid increases at points where the velocity of the fluid increases.
2—The pressure of a fluid decreases at points where the velocity of the fluid increases.
3—It has no practical application in today's aircraft.
4—It applies only to gases.

4214. (1) Bonded clamps are used for support when installing metal tubing.

(2) Unbonded clamps are used for support when installing wiring.

Concerning the above statements,

1—only No. 2 is true.
2—only No. 1 is true.
3—both No. 1 and No. 2 are true.
4—neither No. 1 nor No. 2 is true.

4215. Flexible hose may be used in aircraft fluid systems

1—to replace only low-pressure fluid system lines.
2—to replace any fluid system line not subject to heat.
3—according to the manufacturer's specifications.
4—to replace any fluid system line.

4216. Which of the following nondestructive inspection methods would be most suitable for inspecting wing internal structures?

1—Continuous magnetic particle inspection.
2—Penetrant inspection.
3—Radiographic inspection.
4—Residual magnetic particle inspection.

4217. Magnetic particle inspection is used primarily to detect

1—distortion.
2—irregular surfaces.
3—porosity and thickness of ferromagnetic metals.
4—flaws on or near the surface.

4218. In order for dye penetrant inspection to be effective, the material being checked must

1—have subsurface cracks.
2—be magnetic.
3—be nonmagnetic.
4—have surface cracks.

4219. Which of the following nondestructive testing methods is most successful in detecting intergranular corrosion in nonferrous metal?

1—Spectography inspection.
2—Radiography inspection.
3—Magnetic particle inspection.
4—Eddy current inspection.

4220. Which of the following nondestructive inspection methods would normally be the most satisfactory to determine the internal structural condition of a highly stressed cast aluminum alloy fitting?

1—X-ray or radiographic inspection.
2—Dye penetrant inspection.
3—Magnetic particle inspection.
4—Fluorescent penetrant inspection.

4221. What is the principal advantage of the radiographic inspection method of nondestructive testing?

1—Minimum safety precautions required.
2—Little or no disassembly of structure.
3—Simplicity of equipment operation.
4—Low cost.

4222. What method of magnetic particle inspection is used most often to inspect aircraft parts for invisible cracks and other defects?

1—Residual.
2—Inductance.
3—Continuous.
4—Intermittent.

4223. Which of the following factors is considered basic knowledge of X-ray exposure?

1—The density, thickness, size, and shape of the object to be exposed.
2—The X-ray unit's capabilities and its proper operation.
3—The distance and angle for 1-minute exposure.
4—The type and exact size of the discontinuity to be detected.

4224. Which method of magnetization produces the greatest sensitivity in locating subsurface discontinuities?

1—Continuous circular with a solenoid.
2—Continuous longitudinal with a solenoid.
3—Residual circular with a conductor bar.
4—Residual longitudinal with a conductor bar.

4225. The magnetic particle inspection is somewhat unreliable for distinguishing or detecting

1—laps and fatigue cracks.
2—cold shuts.
3—hairline discontinuities and small cracks.
4—discontinuities which are below the surface.

4226. What type of discontinuities are formed by a parting or a rupture of the metal being magnetically tested?

1—Lap or voids.
2—Cold shut and inclusions.
3—Inclusion and laps.
4—Pipes or voids.

4227. Which statement relating to the residual magnetizing inspection method is true?

1—It requires careful and intelligent interpretation and evaluation of the discontinuities it reveals.
2—It is used in practically all circular and longitudinal magnetizing procedures.
3—It may be used only with steels which have been heat treated for stressed applications.
4—Its indicating medium is applied when the magnetizing force is being maintained.

4228. What two types of indicating mediums are available for magnetic particle inspection?

1—Iron and ferric oxides.
2—Wet and dry process materials.
3—Penetrant and fluorescent material.
4—High retentivity and low permeability material.

4229. Which of the following metals can be inspected using the magnetic particle inspection method?

1—Magnesium alloys.
2—Aluminum alloys.
3—Iron alloys.
4—Copper.

4230. How is an item demagnetized after a magnetic particle inspection?

1—Rinse it with a nonmagnetic solution.
2—Lay it aside for a period of time.
3—Subject it to an alternating current energized coil.
4—Subject the item to direct current.

4231. Which type crack can be detected by magnetic particle inspection using either circular or longitudinal magnetization?

1—45°.
2—Longitudinal.
3—Transverse.
4—Circumferential.

4232. Surface cracks in aluminum castings and forgings may usually be detected by

1—the use of dye penetrants and suitable developers.
2—heating the part to approximately 750° and observing the surface for any material that may have been forced out of a crack.
3—magnetic particle inspection.
4—submerging the part in a concentrated solution of caustic soda (sodium hydroxide) and rinsing with clear water.

4233. To detect a minute crack using dye penetrant inspection requires

1—that the developer be applied to a wet surface.
2—a shorter than normal penetrating time.
3—a longer than normal penetrating time.
4—the surface to be highly polished.

4234. When checking an item with the magnetic particle inspection method, circular and longitudinal magnetization should be used to

1—reveal all possible defects.
2—prevent permanent magnetization.
3—prevent one-way polarization.
4—ensure uniform current flow.

4235. What is the primary limitation of the dye penetrant method of inspection?

1—The defect must be open to the surface.
2—The smaller the defect, the longer the penetrating time required.
3—The washing or rinsing operation causes unreliable results.
4—It is limited in use to a small number of metals.

4236. What is the purpose of the developer as used in dye penetrant inspection?

1—It removes penetrant from surface.
2—It causes penetrant to glow in the dark.
3—It causes penetrant on surface to seep into cracks.
4—It brings out the penetrant to show defects.

4237. Dye penetrant inspection method will detect

1—surface defects.
2—subsurface flaws.
3—deteriorated molded rubber.
4—cracks in any porous material.

4238. Before applying dye penetrant to an aluminum part, first

1—clean the part thoroughly.
2—apply the developer.
3—mix the penetrant with water.
4—mix the penetrant with the developer.

4239. If dye penetrant inspection indications are not sharp and clear, the most probable cause is that

1—the part was not correctly degaussed before the developer was applied.
2—the part is not damaged.
3—the part is badly damaged over an extensive area of its surface.
4—the part was not thoroughly washed before developer was applied.

4240. Which type of current is usually used to demagnetize aircraft parts?

1—Alternating, decreasing.
2—Direct, increasing.
3—Alternating, increasing.
4—Direct, decreasing.

4241. When using the dye penetrant test, it is well to remember that the

1—smaller the defect, the longer the required penetrating time.
2—larger the defect, the longer the required penetrating time.
3—smaller the defect, the shorter the required penetrating time.
4—penetrating time *is independent of the size* of the defect.

4242. If a pure metal is heated above its critical temperature and cooled to room temperature, it will

1—form a mechanical mixture.
2—return to its original structure.
3—form a combination of a solid solution and mechanical mixture.
4—form a complex solution.

4243. The pattern for an inclusion is a magnetic particle buildup forming

1—a fernlike pattern.
2—a single line.
3—a smooth outline.
4—parallel lines.

4244. A part which is being prepared for dye penetrant inspection should be cleaned

1—by sandblasting.
2—with a volatile petroleum–base solvent.
3—with the penetrant developer.
4—with water–base solvents only.

4245. Which type crack will probably cause the most buildup in the magnetic particle indicating medium?

1—Heat–treated.
2—Shrink.
3—Fatigue.
4—Grinding.

4246. Under magnetic particle inspection, a part will be identified as having a fatigue crack under which of the following conditions?

1—The discontinuity pattern is straight.
2—The discontinuity is found in a non–stressed area of the part.
3—The discontinuity is found in a highly stressed area of the part.
4—The discontinuity pattern is not clear.

4247. The main disadvantage of dye penetrant inspection is that

1—the chemicals used are dangerous to the inspection personnel.
2—the defect must be open to the surface.
3—it does not work on nonferrous metals.
4—it is excessively time consuming.

4248. What defects will be detected by magnetizing a part using continuous longitudinal magnetization with a cable?

1—Defects perpendicular to the long axis of the part.
2—Defects parallel to the long axis of the part.
3—Defects perpendicular to the concentric circles of magnetic force within the part.
4—Defects parallel to the concentric circles of magnetic force within the part.

4249. Circular magnetization of a part can be used to detect which of the following defects?

1—Defects parallel to the long axis of the part.
2—Defects perpendicular to the long axis of the part.
3—Defects perpendicular to the concentric circles of magnetic force within the part.
4—Defects parallel to the concentric circles of magnetic force within the part.

4250. What type of corrosion attacks grain boundaries of aluminum alloys which are improperly or inadequately heat–treated?

1—Stress.
2—Intergranular.
3—Surface.
4—Fretting.

4251. If too much time is allowed to elapse during the transfer of 2017 or 2024 aluminum alloy from the heat treatment medium to the quench tank, it may result in

1—case hardening.
2—a dull, stained, or streaked surface.
3—retarded age hardening.
4—impaired corrosion resistance.

4252. Which heat–treating process of metal produces a hard, wear–resistant surface over a strong, tough core?

1—Case hardening.
2—Annealing.
3—Tempering.
4—Normalizing.

4253. When heat treating a small aluminum forging, a cold water quench should be used to produce

1—maximum hardness.
2—minimum distortion.
3—minimum diffusion.
4—maximum corrosion resistance.

4254. Nitriding is a process which

1—forms a hard case on a part to resist wear.
2—decreases the size of the grain structure.
3—toughens steel to increase its tensile strength.
4—increases bearing heat resistance.

4255. The difference between annealing and normalizing steel is that normalizing usually requires temperatures

1—higher than critical point, with slower cooling.
2—lower than critical point, with faster cooling.
3—lower than critical point, with slower cooling.
4—higher than critical point, with faster cooling.

4256. Why is steel tempered after being hardened?

1—To increase its hardness and ductility.
2—To decrease its ductility and brittleness.
3—To increase its strength and decrease its internal stresses.
4—To relieve its internal stresses and reduce its brittleness.

4257. Which of the following aluminum alloy designations indicates that the metal has been solution heat treated and artificially aged?

1—3003–F.
2—7075–T6.
3—5052–H36.
4—6061–0.

4258. Alloy 2024 rivets should be driven within 10 minutes after they have been quenched; otherwise, before being used, they must be

1—aged.
2—normalized.
3—reheat treated.
4—refrigerated.

4259. Which of the following qualities of magnesium alloy are improved by precipitation heat treatment?

1—Ductility and toughness.
2—Ductility and yield strength.
3—Hardness and yield strength.
4—Hardness, ductility, and yield strength.

4260. Which type of steel is best suited for case hardening?

1—Low–carbon, low–alloy.
2—High–carbon, low–alloy.
3—Low–carbon, high–alloy.
4—High–carbon, high–alloy.

4261. Which of the following cannot be heat treated repeatedly without harmful effects?

1—Unclad aluminum alloy in sheet form.
2—Products which are molded of steel.
3—6061–T9 stainless steel.
4—Clad aluminum alloy.

4262. Metal to be tested on the Rockwell Hardness Tester must meet which of the following specification(s)?

1—It must be ground smooth on one side only and cleaned.
2—The two opposite ground surfaces must be free of scratches and foreign matter.
3—The two opposite surfaces must be parallel but not necessarily cleaned.
4—The two opposite ground surfaces should be perpendicular and cleaned.

4263. What will determine the hardness of steel at ordinary temperatures?

1—The number of particles of iron carbide in the mixture.
2—The size of the particles of iron austenite in the mixture.
3—The distribution of the particles of iron matrix throughout the mixture.
4—The transformation of pearlite to austenite in the mixture.

4264. Unless otherwise specified, torque values for tightening aircraft nuts and bolts relate to

1—dry, thoroughly degreased threads.
2—lightly oiled threads.
3—well oiled threads.
4—threads lubricated with a dry lubricant.

4265. Which of the following is generally used in the construction of aircraft engine firewalls?

1—Aluminum alloy sheet.
2—Stainless steel.
3—Chrome–molybdenum alloy steel.
4—Magnesium–titanium alloy steel.

4266. Unless otherwise specified or required, aircraft bolts should be installed so that the bolt head is

1—upward, or in a rearward direction.
2—upward, or in a forward direction.
3—downward, or in a forward direction.
4—downward, or in a rearward direction.

4267. Alclad is a metal consisting of

1—aluminum alloy surface layers and a pure aluminum core.
2—pure aluminum surface layers on an aluminum alloy core.
3—a homogeneous mixture of pure aluminum and aluminum alloy.
4—alternating layers of pure aluminum and aluminum alloy.

4268. A fiber–type, self–locking nut should never be used on an aircraft if the bolt is

1—under shear loading.
2—under tension loading.
3—subject to rotation.
4—to be mounted in a vertical position.

4269. The Society of Automotive Engineers and the American Iron and Steel Institute use a numerical index system to identify the composition of various steels. The symbol 1020 indicates a plain carbon steel containing an average of

1—20.00 percent carbon.
2—2.00 percent carbon by volume.
3—2.00 percent carbon by weight.
4—0.20 percent carbon by weight.

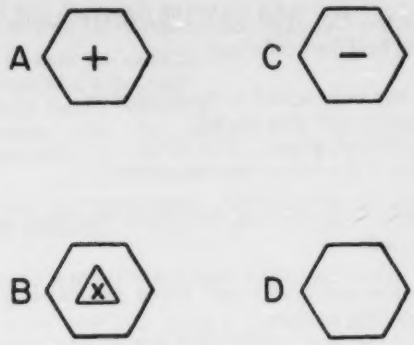

Figure 35

4270. Which of the bolt head code markings shown in Figure 35 identifies a corrosion resistant AN standard steel bolt?

1—A.
2—B.
3—C.
4—D.

4271. Which of the following statements regarding aircraft bolts is correct?

1—AN standard steel bolts are marked with two raised dashes on the bolt head.
2—When tightening castellated nuts on drilled bolts, if the cotter pin holes do not line up, it is not permissible to overtighten the nut to permit alignment of the next slot with the cotter pin hole.
3—In general, bolt grip lengths should equal the material thickness.
4—Alloy steel bolts smaller than 1/4-inch diameter should not be used in primary structure.

4272. Generally speaking, bolt grip lengths should be

1—one and one-half times the thickness of the material through which they extend.
2—equal to the thickness of the material through which they extend plus approximately one diameter.
3—equal to the thickness of the material through which they extend.
4—at least three times the thickness of the thinnest sheet.

4273. Select the grip length of a bolt used to fasten two 5/8-inch steel plates together.

1—1-3/8 inches.
2—1-1/4 inches.
3—3/4 inch.
4—7/8 inch.

4274. When the specific torque value for nuts is not given, where can the recommended torque value be found?

1—Advisory Circular 43.13-2A.
2—FAR Part 43, Appendix D.
3—Technical Standard Order.
4—Advisory Circular 43.13-1A.

4275. Identify the clevis bolt illustrated in Figure 36.

1—A.
2—B.
3—D.
4—C.

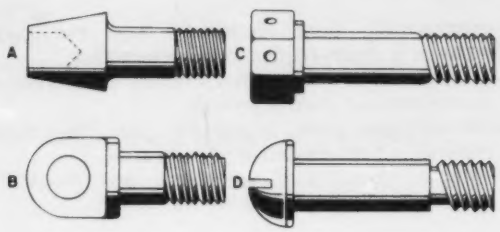

Figure 36

4276. A bolt with a single raised dash on the head is classified as an

1—AN corrosion-resistant steel bolt.
2—NAS standard aircraft bolt.
3—NAS close tolerance bolt.
4—AN aluminum bolt.

4277. How is a clevis bolt used with a fork-end cable terminal secured?

1—With a self-locking nut with a lock washer to prevent rotation of the bolt in the fork.
2—With a shear nut tightened to a snug fit, but with no strain imposed on the fork and safetied with a cotter pin.
3—With a castle nut tightened until slight binding occurs between the fork and the fitting to which it is being attached.
4—With a shear nut and cotter pin or a thin self-locking nut tightened enough to prevent rotation of the bolt in the fork.

4278. A cross inside a triangle on the head of a bolt used on approved aircraft installations would indicate the bolt is a

1—standard corrosion-resistant bolt.
2—special purpose bolt.
3—magnetically inspected bolt.
4—close tolerance bolt.

4279. Where is an AN clevis bolt used in an airplane?

1—In landing gear assemblies.
2—For tension and shear load conditions.
3—Where external tension loads are applied.
4—Only for shear load applications.

4280. A bolt with an X inside a triangle on the head is classified as an

1—AN aluminum alloy bolt.
2—NAS standard aircraft bolt.
3—NAS close tolerance bolt.
4—AN corrosion–resistant steel bolt.

4281. The core material of ALCLAD 2024–T4 is

1—commercially pure aluminum, and the surface material is strain–hardened aluminum alloy.
2—heat–treated aluminum alloy, and the surface material is commercially pure aluminum.
3—commercially pure aluminum, and the surface material is heat–treated aluminum alloy.
4—strain–hardened aluminum alloy, and the surface material is commercially pure aluminum.

4282. The high purity aluminum code number 1100 identifies what type of aluminum?

1—Aluminum alloy containing 11 percent copper.
2—Heat–treated aluminum alloy.
3—Aluminum alloy containing zinc.
4—99 percent commercially pure aluminum.

4283. Aircraft bolts are usually manufactured with a

1—class 1 fit for the threads.
2—class 2 fit for the threads.
3—class 3 fit for the threads.
4—class 4 fit for the threads.

4284. In the four–digit, aluminum index system number 2024, the first digit indicates

1—zinc has been added to the aluminum.
2—the percent of alloy added.
3—the different alloys in that group.
4—copper is the major alloying element.

4285. How is the locking feature of the fiber–type lock nut obtained?

1—By a saw–cut fiber insert with a pinched–in thread in the locking section.
2—By the use of an unthreaded fiber locking insert.
3—By a fiber insert held firmly in place at the base of the load carrying section.
4—By placing the threads in the fiber insert out–of–phase with the load carrying section.

4286. Identify the weld in Figure 37, caused by an excessive amount of acetylene.

1—D.
2—A.
3—C.
4—B.

4287. Using Figure 37, select the illustration which depicts a cold weld.

1—C.
2—A.
3—B.
4—D.

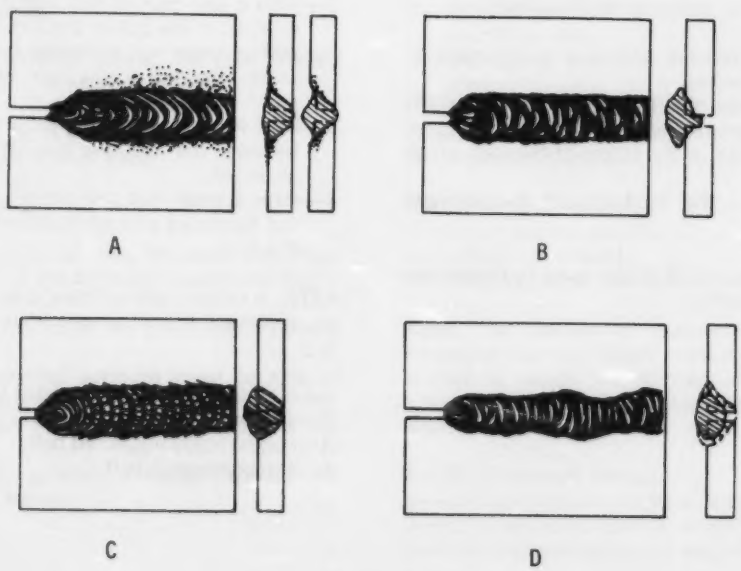

Figure 37

4288. If it is necessary to reweld a joint,

1—use an oversize welding rod.
2—remove all the old weld.
3—preheat before rewelding.
4—increase the temperature to ensure proper penetration.

4289. Why is it considered good practice to normalize a part after welding?

1—To relieve internal stresses developed within the base metal.
2—To burn out any excess carbon deposited during welding.
3—To introduce a slight amount of carbon to improve the surface hardness of the weld.
4—To remove the surface scale formed during welding.

4290. Holes and a few projecting globules are found in a weld. What action should be taken?

1—Fill the holes with solder.
2—Reheat the bead to melt the globules.
3—Remove all the old weld and reweld the joint.
4—File the rough surface.

4291. Select a characteristic of a good gas weld.

1—The depth of penetration shall be sufficient to ensure fusion of the filler rod.
2—The weld should be built up 1/8 inch.
3—The weld should taper off smoothly into the base metal.
4—No oxide should be formed on the base metal.

4292. Which of the following is an unacceptable characteristic of a weld on an aircraft?

1—Projecting globules.
2—Smooth seam.
3—A smooth taper into the base metal.
4—An extra thickness built up at the joint.

4293. What is the most important characteristic that contributes to a sound weld?

1—Inclusions.
2—Fusion.
3—Puddling.
4—Porosity.

4294. One characteristic of a good weld is that no oxide should be formed on the base metal at a distance from the weld of more than

1—1/2 inch.
2—1 inch.
3—1/8 inch.
4—1/4 inch.

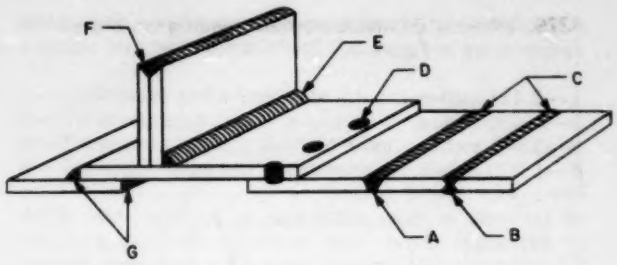

Figure 38

4295. What type weld is shown at A in Figure 38?

1—Fillet.
2—Butt.
3—Lap.
4—Edge.

4296. What type weld is shown at B in Figure 38?

1—Fillet.
2—Double butt.
3—Flat.
4—Edge.

4297. What type weld is shown at G in Figure 38?

1—Lap.
2—Butt.
3—Flat.
4—Edge.

4298. Which tool can be used to measure axle end play?

1—Depth gage.
2—Dial indicator.
3—Axle gage.
4—Protractor.

4299. The measurement reading on the illustrated micrometer in Figure 39 is

1—0.2915.
2—0.2861.
3—0.2911.
4—0.2901.

Figure 39

4300. What is the measurement reading on the vernier caliper scale in Figure 40?

1—1.411 inches.
2—1.436 inches.
3—1.461 inches.
4—1.700 inches.

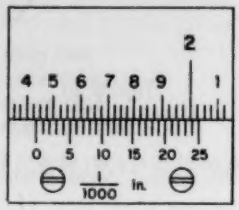

Figure 40

4301. Which tool should you use to measure the clearance between a surface plate and a surface being checked for flatness?

1—Depth gage.
2—Surface gage.
3—Thickness gage.
4—Dial indicator.

4302. If the thimble of a standard micrometer caliper, graduated in thousandths of an inch, is turned one full revolution, the spindle will move

1—0.010 inch.
2—0.040 inch.
3—1.000 inch.
4—0.025 inch.

4303. Which of the following represents the vernier scale graduation of a micrometer?

1—.00001.
2—.001.
3—.0001.
4—.01.

4304. What is the reading of the micrometer illustrated in B of Figure 41?

1—.2252.
2—.2152.
3—.2552.
4—.2557.

4305. Using Figure 41, select the illustration of the micrometer that reads .2403.

1—A.
2—C.
3—B.
4—D.

4306. Which tool is used to find the center of a shaft or other cylindrical work?

1—Combination set.
2—Surface gage.
3—Dial indicator.
4—Micrometer caliper.

4307. If it is necessary to accurately measure the diameter of a hole approximately 3/8 inch in diameter, the mechanic should use a

1—telescoping gage and read the measurement directly from the gage.
2—telescoping gage and determine the size of the hole by taking a micrometer reading of the adjustable end of the telescoping gage.
3—0– to 1–inch inside micrometer and read the measurement directly from the micrometer.
4—small–hole gage and determine the size of the hole by taking a micrometer reading of the ball end of the gage.

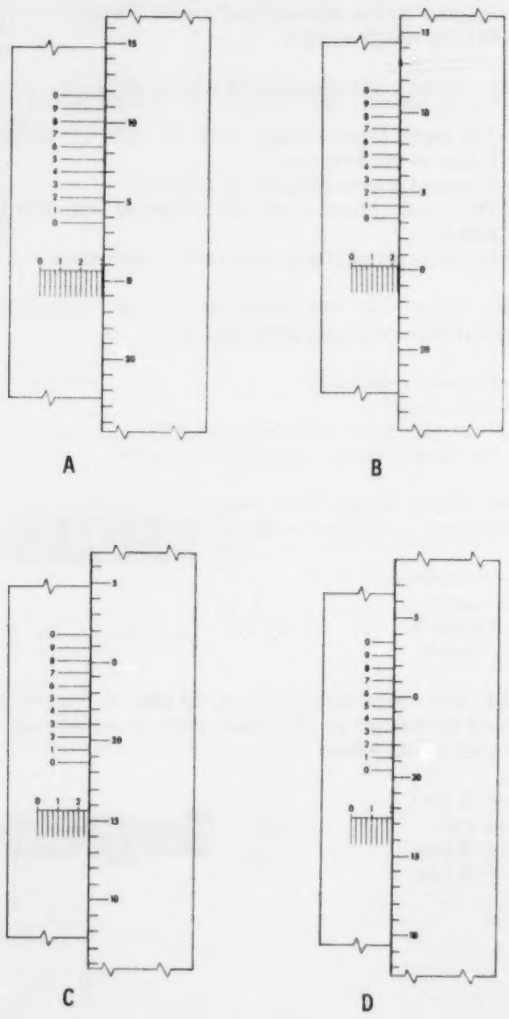

Figure 41

4308. The measurement reading on the micrometer appearing in Figure 42 is

1—.2958.
2—.2902.
3—.2812.
4—.2885.

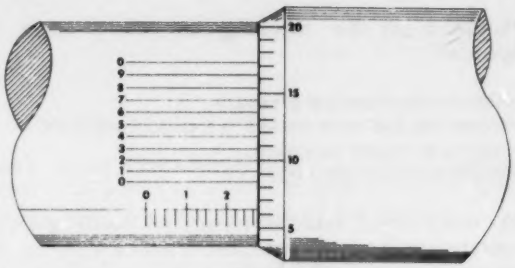

Figure 42

4309. Which of the following is generally used to set a divider to an exact dimension?

1—Machinist scale.
2—Surface gage.
3—Thickness gage.
4—Dial indicator.

4310. Which of the following is generally used to calibrate a micrometer or check its accuracy?

1—Gage block.
2—Dial indicator.
3—Surface gage.
4—Machinist scale.

4311. What precision measuring tool is used for measuring crankpin and main bearing journals for out-of-round wear?

1—Dial gage.
2—V-blocks.
3—Micrometer caliper.
4—Depth gage.

4312. The side clearance of piston rings is measured with a

1—depth gage.
2—thickness gage.
3—hole gage.
4—telescopic gage.

4313. Crankshaft alignment runout can be checked by rotating the shaft on V-blocks and a surface plate. The measurements are taken with a

1—height gage.
2—dial gage.
3—depth gage.
4—telescopic gage.

4314. How can the dimensional inspection of a bearing in a rocker arm be accomplished?

1—Depth gage and micrometer.
2—Thickness gage and V-blocks.
3—Thickness gage and push-fit arbor.
4—Telescopic gage and micrometer.

4315. The twist of a connecting rod is checked by installing push-fit arbors in both ends, supported by parallel steel bars on a surface plate. Measurements are taken between the arbor and the parallel bar with a

1—dial gage.
2—height gage.
3—thickness gage.
4—depth gage.

4316. The clearance between the piston rings and the ring lands is measured with a

1—micrometer caliper.
2—thickness gage.
3—dial gage.
4—depth gage.

4317. Piston-ring gap is measured at a point inside the cylinder, even with the cylinder flange, using a

1—depth gage.
2—thickness gage.
3—dial gage.
4—height gage.

4318. Which statement is correct concerning a valve that is stretched?

1—A gap will be noticeable between the stretch gage and the valve stem.
2—A gap will be noticeable between the stretch gage and the radius of the valve.
3—A gap will be noticeable between the stretch gage and both the valve stem and the valve face.
4—The stretch gage will touch only in the radius that connects the valve stem to the valve face.

4319. Which tool can be used to determine piston pin out-of-round wear?

1—Telescopic gage.
2—Micrometer caliper.
3—Dividers.
4—Dial indicator.

4320. During starting of a turbojet powerplant using a compressed air starter, a hung start occurred. Select the proper procedure from the following.

1—Advance the power lever.
2—Increase airpower to the starter.
3—Re-engage the starter.
4—Shut the engine down.

4321. When towing an aircraft,

1—discharge all hydraulic pressure to prevent accidental operation of the landing gear retracting mechanism.
2—all tailwheel aircraft must be towed backwards.
3—if the aircraft has a steerable nosewheel, the locking scissors should be set to full swivel.
4—all nosewheel aircraft must be towed backwards.

4322. When starting an aircraft engine equipped with a float–type carburetor, the carburetor air heat control should be placed in

1—the COLD position.
2—the COLD position under non–icing conditions and in the HOT position under icing conditions.
3—the HOT position to reduce the engine warmup period.
4—a position between HOT and COLD.

4323. When approaching the front of an idling turbojet engine, the hazard area extends forward of the engine approximately

1—35 feet.
2—5 feet.
3—15 feet.
4—25 feet.

4324. The most satisfactory extinguishing agent for use in case of carburetor or intake fire is

1—dry chemical.
2—carbon tetrachloride.
3—carbon dioxide.
4—fine water spray.

4325. Identify the signal to engage rotor on a rotorcraft in Figure 43.

1—A.
2—B.
3—D.
4—C.

4326. Starting a reciprocating engine which has a liquid lock in one of the cylinders could cause

1—compressive failure of the valve bodies.
2—starter clutch damage.
3—removal of the lubricating film on the cylinder walls.
4—major structural damage.

4327. The priming of a fuel injected horizontally opposed engine is accomplished by placing the fuel control lever in which of the following?

1—AUTO–LEAN position.
2—IDLE–CUTOFF position.
3—AUTO–RICH position.
4—FULL–RICH position.

4328. Which of the following can be a cause of preignition?

1—High intake manifold pressure.
2—Vaporized fuel compressed to a critical pressure.
3—Feathered edges on valves.
4—Excessive spark plug gap.

4329. Which action would be required if the turbine inlet temperature exceeds the specified maximum during the starting sequence of a turboprop engine?

1—Turn off the fuel and ignition switch, discontinue the start and make an investigation.
2—Advance the power lever and observe for excessive smoke, if present, discontinue the start.
3—Continue the start since temperature will stabilize as soon as 5,000 RPM is reached.
4—Turn off the fuel and ignition switch, discontinue the start, then wait 5 minutes and initiate the starting sequence.

4330. How is a flooded engine, equipped with a float–type carburetor, cleared of excessive fuel?

1—Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch off, and the throttle fully open, until the fuel charge has been cleared.
2—Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch off, and the throttle closed, until the fuel has been cleared.
3—Turn off the fuel and the ignition. Discontinue the starting attempt until the excess fuel has cleared.
4—Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch on, and the throttle fully open, until the excess fuel has cleared or until the engine starts.

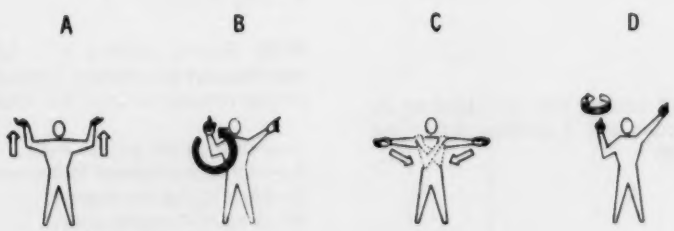

Figure 43

Figure 44

4331. If fuel flows steadily from the internal supercharger drain valve during an attempt to start an engine, which of the following is a possible cause of the trouble?

1—Excessive booster pump pressure.
2—The fuel pump relief valve is out of adjustment.
3—An improper setting of the mixture control.
4—A fatigued carburetor fuel supply line.

4332. Which of the hand signals in Figure 44, would you give if a taxiing aircraft were in danger of striking some object?

1—C.
2—A.
3—B.
4—D.

4333. Induction fires during starting can be extinguished by

1—directing carbon dioxide into the air intake of the engine.
2—directing carbon dioxide into the exhaust system.
3—closing the fuel shutoff valve.
4—closing the throttle.

4334. Which of the following indicators should be checked immediately after starting a reciprocating engine?

1—Oil pressure.
2—Manifold pressure.
3—Tachometer.
4—Cylinder head temperature.

4335. During the starting sequence of a turboprop engine, there is no oil pressure indication at 5,000 RPM for either the reduction gear or the power unit. What action is required?

1—Turn off the ignition switch and fuel, discontinue the start, and replace the oil pressure gauge.
2—Turn off the ignition switch and fuel, let the engine motorize for 5 minutes, and restart.
3—Turn off the ignition switch and fuel, discontinue the start, and make an investigation.
4—Turn off the ignition switch and fuel, discontinue the start, wait for 5 minutes, and initiate the starting sequence.

4336. When starting an engine equipped with a float–type carburetor with an idle cutoff unit, the mechanic should place the mixture control in the

1—IDLE–CUTOFF position.
2—FULL–LEAN position.
3—FULL–RICH position while priming the engine; however, the mixture control should be returned to the IDLE–CUTOFF position when actually starting the engine.
4—FULL–RICH position.

4337. When approaching the rear of an idling turbojet engine, the hazard area extends aft of the engine approximately

1—200 feet.
2—100 feet.
3—25 feet.
4—5 feet.

4338. During starting of a turbojet powerplant using a compressed air starter, a hot start occurrence was recorded. Select what happened from the following.

1—The pneumatic starting unit overheated.
2—The pneumatic starter overheated.
3—The powerplant was preheated before starting.
4—The fuel/air mixture was excessively rich.

4339. Aviation gasoline mixed with jet fuel will have the following effects on turbine powerplant efficiency.

1—No disadvantages.
2—The tetraethyl lead in the gasoline forms deposits on the turbine blades.
3—The tetraethyl lead in the gasoline forms deposits on the compressor blades.
4—Continuous use will not affect engine efficiency.

4340. What would be the action to take if aviation gasoline in an aircraft was contaminated with jet fuel?

1—Determine the type jet fuel, then contact the engine manufacturer for guidance.
2—Adjust mixture to compensate for lower octane.
3—Determine the amount of fuel put in tanks and if under 25 percent of total volume, do nothing. If over 25 percent, drain the tanks and refill.
4—Drain fuel tanks and fill with proper octane rated fuel.

4341. Jet fuel is more susceptible to contamination than aviation gasoline.

(1) Jet fuel is of higher viscosity and therefore holds contaminants better.

(2) Viscosity has no relation to contamination of fuel.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Only No. 2 is true.
3—Both No. 1 and No. 2 are true.
4—Neither No. 1 nor No. 2 is true.

4342. Identify the color of low-lead 100LL aviation gasoline.

1—Blue.
2—Green.
3—Orange.
4—Purple.

4343. What is the identification color for turbine fuel?

1—Blue.
2—Green.
3—Straw.
4—Purple.

4344. How are aviation fuels, which possess greater antiknock qualities than 100 octane, classified?

1—As antidetonants.
2—According to the milliliters of lead.
3—By reference to normal heptane.
4—By performance numbers.

4345. Why is ethylene dibromide added to all grades of aviation gasoline?

1—To prevent detonation at takeoff power settings.
2—To remove zinc silicate deposits from the spark plugs.
3—To scavenge lead oxide from the cylinder combustion chambers.
4—To increase the antiknock rating of the fuel.

4346. Both gasoline and kerosene have certain advantages for use as turbine fuel. Which of the following is a true statement in reference to the advantages of each?

1—Kerosene has a higher heat energy per unit weight than gasoline.
2—Gasoline is a better lubricant than kerosene (important in regard to fuel metering pumps).
3—Gasoline has a higher heat energy per unit volume than kerosene.
4—Kerosene has a higher heat energy per unit volume than gasoline.

4347. What characteristic of a fuel reduces its tendency to vapor lock?

1—Low latent heat of vaporization.
2—High volatility.
3—Low vapor pressure.
4—High octane rating or performance number.

4348. Characteristics of detonation are:

1—rapid rise in cylinder pressure, excessive cylinder head temperature, and an increase in engine power.
2—cylinder pressure remains the same, excessive cylinder head temperature, and a decrease in engine power.
3—rapid rise in cylinder pressure, excessive cylinder head temperature, and a decrease in engine power.
4—rapid rise in cylinder pressure, cylinder head temperature normal, and a decrease in engine power.

4349. A fuel that vaporizes too readily may cause

1—hard starting.
2—detonation.
3—slow warmup.
4—vapor lock.

4350. Jet fuel number identifiers are

1—performance numbers to designate the volatility of the fuel.
2—performance numbers and are relative to the fuel's performance in the aircraft engine.
3—type numbers and have no relation to the fuel's performance in the aircraft engine.
4—type numbers used to designate the vaporization rate at atmospheric pressure.

4351. The second number in a fuel rating (100/130) is the

1—lean mixture antiknock rating.
2—percent of iso-octane in the fuel.
3—percent of normal heptane in the fuel.
4—rich mixture antiknock rating.

4352. Characteristics of aviation gasoline are

1—high heat value, high volatility.
2—high heat value, low volatility.
3—low heat value, high volatility.
4—low heat value, low volatility.

4353. Tetraethyl lead is added to gasoline to

1—retard the formation of corrosives.
2—lubricate the valve seats.
3—improve the gasoline's performance in the engine.
4—dissolve the moisture in the gasoline.

4354. A fuel that does not vaporize readily enough can cause

1—vapor lock.
2—detonation.
3—hard starting.
4—surface ignition.

4355. Which of the following materials would be used to clean magnesium engine parts prior to painting?

1—Dichromate solution.
2—Acetone.
3—MEK (methyl ethyl ketone).
4—20 percent caustic soda solution.

4356. How may magnesium engine parts be cleaned?

1—Soak in a 20 percent caustic soda solution.
2—Wash with gasoline.
3—Spray with MEK (methyl ethyl ketone).
4—Wash with a commercial solvent, decarbonize, and scrape or grit blast.

4357. Which solvent is recommended for removing grease from fabric prior to doping?

1—Kerosene.
2—Acetone.
3—Toluene.
4—Turpentine.

4358. When an anodized surface coating is damaged in service, it can be partially restored by

1—use of a metal polish.
2—chemical surface treatment.
3—complete penetration of an inhibitor.
4—a suitable mild cleaner.

4359. If a nickel-cadmium battery electrolyte is spilled on the hands, what agent may be used to rinse the affected area?

1—Boric acid solution.
2—Baking soda solution.
3—Ammonia solution.
4—Potassium hydroxide solution.

4360. Select the solvent recommended for wipedown of cleaned surfaces just before painting.

1—Aliphatic naphtha.
2—Trichloroethane.
3—Dry-cleaning solvent.
4—Kerosene.

4361. Which of the following is used for general cleaning of aluminum surfaces by mechanical means?

1—Carborundum paper.
2—Aluminum wool.
3—Crocus cloth.
4—Steel wool.

4362. Select the solvent used to clean acrylics and rubber.

1—Aliphatic naphtha.
2—Methyl ethyl ketone.
3—Aromatic naphtha.
4—Methyl chloroform.

4363. Select the solvent used to clean metal surfaces and as a paint stripper for small areas.

1—Kerosene.
2—Methyl ethyl ketone.
3—Dry-cleaning solvent.
4—Methyl chloroform.

4364. Fayed surfaces cause concern in chemical cleaning because of the danger of

1—electrostatic charge buildup.
2—electrochemical attack.
3—entrapping corrosive materials.
4—corrosion by imbedded iron oxide.

4365. What effect does a caustic cleaning product have on aluminum structures?

1—Electrochemical.
2—Mechanical.
3—Strengthening.
4—Corrosive.

4366. Fretting corrosion between closely fitting metal parts

1—is cause for rejection of the part.
2—may occur when steel bushings are pressed into aluminum parts with too tight a fit.
3—occurs only when two dissimilar metals are in contact.
4—may be repaired by light oiling and retightening of the parts.

4367. The lifting or flaking of a metal surface is known as exfoliation. This delamination of the grain boundaries is sometimes known as

1—dissimilar metal corrosion.
2—intergranular corrosion.
3—stress corrosion.
4—climatic condition corrosion.

4368. Select the metal on which corrosion forms a greenish film.

1—Copper and its alloy.
2—Aluminum and its alloy.
3—Steel and iron.
4—Titanium and its alloy.

4369. Alodizing is a chemical treatment for aluminum alloys to improve their paint-bonding qualities and to

1—decrease their corrosion resistance.
2—make their surface slightly alkaline.
3—relieve their surface stresses.
4—increase their corrosion resistance.

4370. Metals and alloys of greatly differing composition should not be in direct contact with each other because

1—of the possibility of generating static charges which interfere with radio reception.
2—of the different rates of expansion.
3—of their unequal tensile strengths.
4—deterioration may result from electrochemical action at point of contact.

4371. What is the best means of removing rust from steel?

1—Mechanical.
2—Electrical.
3—Chemical.
4—Biochemical.

4372. How is alodine applied to aluminum alloys?

1—As part of the priming process.
2—By dipping.
3—As part of the manufacturing process.
4—Concurrently with the alclad.

4373. The lifting or flaking of the metal at the surface due to delamination of grain boundaries caused by the pressure of corrosion residual product buildup is called

1—brinelling.
2—electrolysis.
3—transgranulation.
4—exfoliation.

4374. The artificial production of a film of hydroxide on the surface of aluminum or any of its alloys is commonly called

1—alodizing.
2—parco lubrizing.
3—anodizing.
4—dichromating.

4375. Why are parts rinsed thoroughly in hot water after they have been heat-treated in a sodium and potassium nitrate bath?

1—To prevent corrosion.
2—To prevent blistering.
3—To reduce warpage.
4—To retard discoloration.

4376. Intergranular corrosion in structural aluminum alloy parts

1—is not likely to occur in parts fabricated from heat-treated sheet aluminum.
2—may be detected by the white, powdery deposit formed on the surface of the metal.
3—is not likely to occur in parts fabricated from aluminum-coated alloys (ALCLAD or PURECLAD).
4—cannot always be detected by surface indications.

4377. Intergranular corrosion is caused by

1—improper heat treatment.
2—dissimilar metal contact.
3—improperly assembled components.
4—poor application of zinc chromate primer.

4378. Which of the following types of corrosion may exist in aircraft structure and not be visible?

1—Electrolytic corrosion.
2—Bonderizing corrosion.
3—Climatic condition corrosion.
4—Surface corrosion.

4379. Corrosion should be removed from magnesium parts with a

1—steel wire brush.
2—carborundum abrasive.
3—stiff, hog-bristle brush.
4—steel burnishing tool.

4380. Why is it important not to rotate the propeller shaft after the final spraying of corrosion-preventive mixture into cylinders installed on removed engines?

1—The link rods may be damaged by hydraulic lock.
2—The corrosion preventive mixture will be excessively diluted.
3—The engine may fire and cause injury to personnel.
4—The seal of corrosion preventive mixture will be broken.

4381. Why is a plastic surface flushed with fresh water before it is cleaned with soap and water?

1—To prevent crazing.
2—To prevent scratching.
3—To remove oil and grease.
4—To prevent softening the plastic.

4382. What should be done to prevent rapid deterioration when a tire becomes covered with lubricating oil?

1—Wipe the tire with a dry cloth, and then dry with compressed air.
2—Wipe the tire with a dry cloth followed by a washdown with soap and water.
3—Wash the tire with a petroleum solvent, and then dry with compressed air.
4—Wash the tire with alcohol or lacquer thinner to neutralize the action of the oil.

4383. Galvanic action caused by dissimilar metal contact may best be prevented by

1—applying a nonporous dielectric material between the surfaces.
2—priming both surfaces with a light coat of zinc chromate primer.
3—special precautions are not required if they are properly bonded.
4—application of paper tape between the surfaces.

4384. Corrosion caused by electrolytic action is the result of

1—excessive anodization.
2—contact between two unlike metals.
3—the wrong quenching agent.
4—excessive etching.

4385. To prevent corrosion between dissimilar metal joints in which magnesium alloy is involved,

1—prime only the magnesium part with one coat of zinc chromate primer and put a leather gasket between the pieces.
2—the magnesium part must be plated with the same metal as the part it will be in contact with.
3—coat both mating surfaces with an aluminized varnish.
4—prime both parts with two coats of zinc chromate primer and place a layer of pressure sensitive vinyl tape between them.

4386. The interior surface of sealed structural steel tubing is best protected against corrosion by

1—purging the interior with dry air before sealing.
2—a coating of hot linseed oil.
3—evacuating the tubing before sealing.
4—a coating of zinc chromate paint.

4387. Failure to quench a piece of aluminum in the minimum required time could result in

1—failure of the ALCLAD to adhere properly.
2—causing the aluminum to become extremely brittle.
3—impairing the corrosion resisting qualities of the metal.
4—difficulty in preparing the surface for painting.

4388. What power of ten is equal to 1,000,000?

1—10 to the third power.
2—10 to the fourth power.
3—10 to the fifth power.
4—10 to the sixth power.

4389. Find the square root of 1,746.

1—41.7852.
2—41.7752.
3—40.7742.
4—42.7854.

4390. The result of nine raised to the fourth power is which of the following?

1—6,491.
2—6,461.
3—6,941.
4—6,561.

4391. Find the square root of 3,722.1835.

1—61.00971.
2—61.00.
3—60.009.
4—61.0097.

4392. Find the square of 212.

1—40,144.
2—43,924.
3—44,944.
4—44,844.

4393. Find the value of ten raised to the negative sixth power.

1—0.000001.
2—0.000010.
3—0.0001.
4—0.00001.

4394. What is the square root of four raised to the fifth power?

1—32.
2—64.
3—16.
4—20.

4395. The number 3.47 X 10 to the negative fourth power is equal to

1—3,470.00.
2—34,700.0.
3—0034.70.
4—.000347.

4396. Which alternative answer is equal to 16,300?

1—1.63 X 10 to the fourth power.
2—1.63 X 10 to the negative third power.
3—163 X 10 to the negative second power.
4—1,630 X 10 to the negative first power.

4397. Find the square root of 125.131.

1—111.8 X 10 to the third power.
2—.1118 X 10 to the negative second power.
3—1,118 X 10 to the negative second power.
4—11.186 X 10 to the negative third power.

4398. What is the square root of 16 raised to the fourth power?

1—1,024.
2—64.
3—4,096.
4—256.

4399. Solve the following:

$$\frac{\sqrt[2]{31} + \sqrt[2]{43}}{(17)^2}$$

1—.0297.
2—.1680.
3—.7132.
4—.0419.

4400. The result of seven raised to the third power plus the square root of 39 is equal to

1—349.24.
2—27.24.
3—343.24.
4—2,407.24.

4401. Find the square root of 1,824.

1—42.708 X 10 to the negative second power.
2—.42708.
3—4,270.8.
4—.42708 X 10 to the second power.

4402. The total piston displacement of a specific engine is

1—dependent on the compression ratio.
2—dependent on the volumetric efficiency.
3—the volume displaced by all the pistons during one revolution of the crankshaft.
4—the volume displaced by one piston during one revolution of the crankshaft.

4403. Compute the area of the trapezoid in Figure 45.

1—40 square feet.
2—32 square feet.
3—240 square feet.
4—960 square feet.

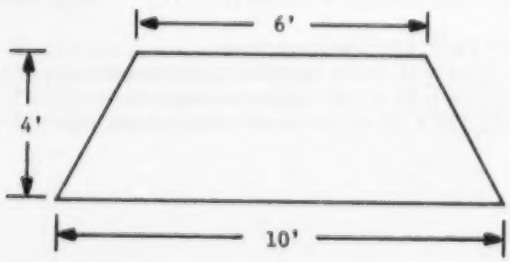

Figure 45

4404. What size sheet of metal is required to fabricate a cylinder 20 inches long and 8 inches in diameter?

Note: C = 3.1416 X d

1—20" X 25-5/32".
2—20" X 24-9/64".
3—20" X 25-9/64".
4—20" X 24-5/32".

4405. Find the area of the right triangle shown in Figure 46.

1—5 sq. in.
2—6 sq. in.
3—9 sq. in.
4—12 sq. in.

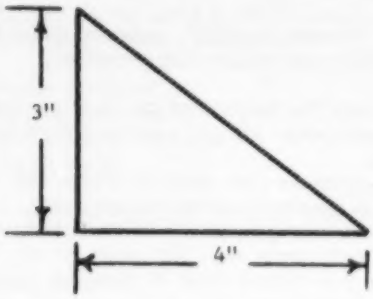

Figure 46

4406. What force is exerted on the piston in a hydraulic cylinder if the area of the piston is 1.2 square inches and the fluid pressure is 850 PSI?

1—1,020 lb.
2—1,220 lb.
3—960 lb.
4—850 lb.

4407. The cylinder of an aircraft engine has a bore of 4.75 inches and a stroke of 4.5 inches. What is the piston displacement of one cylinder?

1—64.34 cu. in.
2—33.58 cu. in.
3—318.81 cu. in.
4—79.74 cu. in.

4408. A rectangular-shaped fuel tank measures 60 inches in length, 30 inches in width, and 12 inches in depth. How many cubic feet are within the tank?

1—12.5.
2—15.0.
3—18.5.
4—21.0.

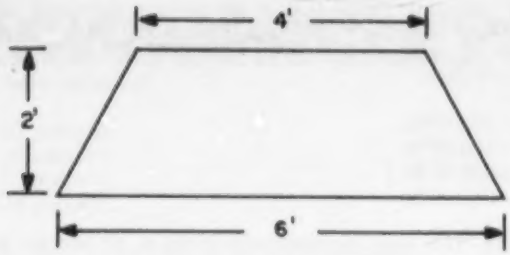

Figure 47

4409. Compute the area of the trapezoid in Figure 47.

1—8 sq. ft.
2—24 sq. ft.
3—48 sq. ft.
4—10 sq. ft.

4410. Determine the area of the triangle formed by points A, B, and C in Figure 48.

A to B = 7.5 inches
A to D = 16.8 inches

1—7.07 sq. in.
2—42 sq. in.
3—63 sq. in.
4—126 sq. in.

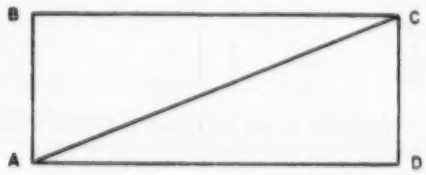

Figure 48

4411. What is the piston displacement of a master cylinder with a 1.5–inch diameter bore and a piston stroke of 4 inches?

1—1.7671 cu. in.
2—9.4247 cu. in.
3—7.0685 cu. in.
4—6.1541 cu. in.

4412. How many gallons of fuel will be contained in a rectangular–shaped tank which measures 2 feet in width, 3 feet in length, and 1 foot 8 inches in depth?
(7.5 gal. = 1 cu. ft.)

1—66.6.
2—75.
3—110.
4—45.

4413. A rectangular–shaped fuel tank measures 27–1/2 inches in length, 9 inches in width, and 8–1/4 inches in depth. How many gallons will the tank contain?
(231 cu. in. = 1 gal.)

1—18.8.
2—6.4.
3—8.8.
4—16.4.

4414. A four–cylinder aircraft engine has a cylinder bore of 3.78 inches and is 8.5 inches deep. With the piston on bottom center, the top of the piston measures 4.0 inches from the bottom of the cylinder. What is the approximate piston displacement of this engine?

1—200 cu. in.
2—360 cu. in.
3—320 cu. in.
4—235 cu. in.

4415. A rectangular–shaped fuel tank measures 37–1/2 inches in length, 14 inches in width, and 8–1/4 inches in depth. How many cubic inches are within the tank?

1—525.
2—433.125.
3—4,331.25.
4—309.375.

4416. Select the fraction which is equal to .020.

1—3/16.
2—1/5.
3—2/7.
4—1/50.

4417. Select the decimal which is equal to the mixed number 1–7/32.

1—1.2188.
2—1.3932.
3—1.7320.
4—1.3270.

4418. If the volume of a cylinder with the piston at bottom center is 84 cubic inches and the piston displacement is 70 cubic inches, then the compression ratio is

1—7:1.
2—1.2:1.
3—6:1.
4—1.9:1.

4419. Express 7/8 as a percent.

1—.785 percent.
2—78.5 percent.
3—.875 percent.
4—87.5 percent.

4420. What is the speed of a spur gear with 42 teeth driven by a pinion gear with 14 teeth turning 420 RPM?

1—14 RPM.
2—42 RPM.
3—160 RPM.
4—140 RPM.

4421. An engine develops 108 horsepower at 87 percent power. What horsepower would be developed at 65 percent power?

1—80.
2—94.
3—70.
4—64.

4422. Which of the following alternatives is the decimal equivalent of the fraction 43/32?

1—1.34375.
2—1.43325.
3—1.32435.
4—1.74415.

4423. Select the fractional equivalent for a 0.09375–thick sheet of aluminum.

1—5/64.
2—5/32.
3—3/64.
4—3/32.

4424. Express 5/8 as a percent.

1—62 percent.
2—.625 percent.
3—.620 percent.
4—62.5 percent.

4425. Select the decimal which is most nearly equal to 77/64.

1—1.8311.
2—0.8311.
3—1.2031.
4—1.3120.

4426. An airplane flying a distance of 875 miles used 70 gallons of gasoline. How many gallons will it need to travel 3,000 miles?

1—108 gallons.
2—120 gallons.
3—240 gallons.
4—144 gallons.

4427. What is the speed ratio of a gear with 36 teeth meshed to a gear with 20 teeth?

1—12 to 5.
2—12 to 6.6.
3—9 to 5.
4—17 to 10.

4428. A pinion gear with 14 teeth is driving a spur gear with 42 teeth at 140 RPM. Determine the speed of the pinion gear.

1—588 RPM.
2—196 RPM.
3—420 RPM.
4—240 RPM.

4429. The parts department's profit is 12 percent on a new magneto. How much does the magneto cost if the selling price is $145.60?

1—$128.12.
2—$120.00.
3—$125.60.
4—$130.00.

4430. An engine of 125 horsepower maximum is running at 65 percent power. What is the horsepower being developed?

1—93.05.
2—30.85.
3—81.25.
4—38.85.

4431. An engine of 98 horsepower maximum is running at 75 percent power. What is the horsepower being developed?

1—87.00.
2—33.30.
3—73.50.
4—41.30.

4432. A blueprint shows a hole of 0.17187 to be drilled. Which fraction size drill bit is most nearly equal?

1—11/64.
2—9/64.
3—9/32.
4—11/32.

4433. Which of the following decimals is most nearly equal to a bend radius of 31/64?

1—0.0645.
2—0.6450.
3—0.48437.
4—0.3164.

4434. Sixty–five engines are what percent of 80 engines?

1—71 percent.
2—81 percent.
3—65 percent.
4—52 percent.

4435. The radius of a piece of round stock is 7/32. Select the decimal which is most nearly equal to the diameter.

1—0.2187.
2—0.5343.
3—0.4375.
4—0.3531.

4436. Maximum engine life is 900 hours. Recently, 27 engines were removed with an average life of 635.30 hours. What percent of the maximum engine life has been achieved?

1—71 percent.
2—72 percent.
3—73 percent.
4—74 percent.

4437. What is the ratio of 10 feet to 30 inches?

1—4:1.
2—1:3.
3—1:4.
4—3:1.

4438. How much current does a 30V motor, 1/2 horsepower, 85 percent efficient, draw from the bus?

(Note: 1 hp. = 746 watts.)

1—14.6 amperes.
2—12.4 amperes.
3—12.3 amperes.
4—14.1 amperes.

4439. Solve the following:

$[(4 \times -3) + (-9 \times +2)] \div 2 =$

1— 0.
2— −30.
3— −15.
4— −5.

4440. Solve the following:

$(64 \times 3/8) \div 3/4 =$

1—16.
2—24.
3—32.
4—72.

4441. Solve the following:

$-18.4 + 0.07 - 2.2 + 8.36 =$

1— +12.17.
2— −12.31.
3— +12.31.
4— −12.17.

4442. Solve the following:

$1/2 + 7/8 - 1/3 =$

1—1-11/16.
2—1-1/24.
3—1-1/12.
4—1-3/8.

4443. Solve the following:

$(1\text{-}1/2 \times 7/8) + 1/4 =$

1—1-11/16.
2—1-3/4.
3—1-9/16.
4—1-17/32.

4444. Solve the following:

$(32 \times 3/8) \div 1/6 =$

1—16.
2—12.
3—2.
4—72.

4445. What is the ratio of a gasoline fuel load of 200 gallons to one of 1,680 pounds?

1—3:7.
2—5:7.
3—2:3.
4—5:42.

4446. Solve the following:

$(2\text{-}1/2 \times 1\text{-}3/8) + 2\text{-}3/4 =$

1—6-3/16.
2—6-1/4.
3—3-5/16.
4—4-3/4.

4447. Solve the following:

$5/9\,(41 + 40) - 40 =$

1—5.
2—4.55.
3—22.3.
4—73.8.

4448. Solve the following:

$(32 \times 3/16) \div 1/2 =$

1—16.
2—12.
3—72.
4—1.5.

4449. Solve the following:

$2/4\,(30 + 34)\,5 =$

1—117.
2—160.
3—345.
4—640.

$$\frac{(-35 + 25)(-7) + (\pi)(16^{-2})}{\sqrt{25}} =$$

Figure 49

4450. Solve the equation in Figure 49.

1— 16.51.
2— 174.85.
3— −81.49.
4— 14.00.

4451. Solve the following equation:

$$\frac{-4\overline{)125}}{-6\overline{)-36}}$$

1— +31.25.
2— −5.20.
3— −31.25.
4— +6.05.

4452. Solve the following:

$4 - 3[-6(2+3) + 4] =$

1— 82.
2— 33.
3— −25.
4— −71.

4453. Solve the following:

$-6[-9(-8+4) - 2(7+3)] =$

1— 16.
2— −332.
3— 216.
4— −96.

4454. Solve the following:

$5[4 - (+3 - 4) + 13] - 6 =$

1— 84.
2— 21.
3— 17.
4— −16.

4455. Which of the following provides a place for indicating compliance with FAA Airworthiness Directives or manufacturers' service bulletins?

1—Structural repair manual.
2—Aircraft overhaul manual.
3—Aircraft maintenance records.
4—Illustrated parts catalog.

4456. An aircraft was not approved for return to service after an annual inspection and the owner wanted to fly the aircraft to another maintenance base. Which statement is correct?

1—The owner must obtain a special flight permit.
2—The aircraft must be repaired and approved prior to any flight.
3—The aircraft may be flown to another maintenance base if the discrepancies are not "safety of flight" items.
4—The owner must obtain a restricted category type certificate.

4457. When should special inspection procedures be followed to determine if any damage to the aircraft structure has occurred?

1—Progressive inspection.
2—100-hour inspection.
3—Overweight landing.
4—Annual inspection.

4458. During an annual inspection, if a defect is found which makes the aircraft unairworthy, the person disapproving must

1—remove the airworthiness certificate from the aircraft.
2—submit a Malfunction or Defect Report.
3—provide a written notice of the defect to the owner.
4—repair the defect before completion of the inspection.

4459. What is the means by which the FAA notifies aircraft owners and other interested persons of unsafe conditions and prescribes the condition under which the product may continue to be operated?

1—Airworthiness Directives.
2—Supplemental Type Certificates.
3—Malfunction or Defect Reports.
4—Technical Standard Orders.

4460. Where should you find this entry?

"Removed right wing from aircraft and removed skin from outer 6 feet. Repaired buckled spar 49 inches from tip in accordance with Figure 8 in the manufacturer's structural repair manual No. 28-1."

1—Aircraft engine maintenance record.
2—AD compliance record.
3—FAA Form 337.
4—Service bulletin compliance record.

4461. Which of the following is a powerplant major repair?

1—Installation of an accessory which is not approved for the engine.
2—Separation of a crankcase of a reciprocating engine equipped with an integral supercharger.
3—Overhaul of pressure-type carburetors, and pressure-type fuel and oil pumps.
4—Disassembly of a crankshaft of a reciprocating engine equipped with a spur-type propeller reduction gear.

4462. Which of the following is an airframe major repair?

1—Removal, installation, and repair of landing gear tires.
2—Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.
3—Rewinding the field coil of an electrical accessory.
4—The repair of portions of skin sheets by making additional seams.

4463. What maintenance action should follow if the maintenance record contained the following entry?

"During flight the aircraft engine experienced sudden deceleration."

1—Perform power output check (static and idle RPM).
2—Perform the engine group inspection for the annual/progressive.
3—Perform power output check with vibration analyzer (static and idle RPM).
4—Perform sudden stoppage inspection.

4464. Which of the following aircraft record entries best describes a repair of a 6–1/4–inch crack in the top skin of a stabilizer?

1—Stop–drilled the crack. Make permanent repair at next scheduled annual inspection.
2—Stop–drilled the crack using a 1/8–inch drill, installed a patch plate two times the length of the crack, two–row rivet spacing two times the diameter of the rivet with a rivet edge distance of three times the diameter of the rivet used.
3—Cut out the defective area, installed a flush repair using the same rivet size, spacing materials, and pattern as the adjacent area.
4—Cut out the defective area, installed a flush repair using the same material, rivet size, and unit spacing as the adjacent area and a rivet edge distance of two times the diameter of the rivets used.

4465. Which of the following statements best describes the entry made in an aircraft record for the repair of a 2–inch crack located in the center of a plastic side window?

1—Stop–drilled both ends of the crack, cut a piece of plastic 1–1/2 inches larger than the crack, heated the patch in an oil bath and formed to the contour to be patched, applied plastic adhesive, pressed in place, and let dry under pressure for 3 hours.
2—Stop–drilled both ends of the crack, cut a piece of plastic 3/4 inch larger than the crack, heated the patch in an oil bath and formed to the contour to be patched, applied plastic adhesive, pressed in place, and let dry under pressure for 3 hours.
3—Stop–drilled both ends of the crack, cut a piece of plastic 3/4 inch larger than the crack, heated the patch in an oil bath or boiling water and formed to the contour to be patched, and applied plastic adhesive, pressed in place, and let dry under pressure for 3 hours.
4—Stop–drilled both ends of the crack. Glued a piece of plastic over the crack.

4466. Which of the following aircraft record entries best describes a repair of a dent in a tubular steel structure dented at a cluster?

1—Removed and replaced all the members of the cluster.
2—Removed and replaced the damaged member.
3—Welded a reinforcing plate over the dented area.
4—Filled the damaged area with a molten metal and dressed to the original contour.

4467. Who is responsible for making the entry in the maintenance records after an annual, 100–hour, or progressive inspection?

1—Any certificated airframe mechanic.
2—The owner or operator of the aircraft.
3—The person approving or disapproving for return to service.
4—The pilot performing the test flight.

4468. An aircraft owner was provided a list of discrepancies on an aircraft that was not approved for return to service after an annual inspection. Which statement is correct concerning who may correct the discrepancies?

1—Only a mechanic with an Inspection Authorization.
2—An appropriately rated mechanic.
3—Any certificated repair station.
4—The owner or operator of the aircraft.

4469. When entering a major repair in an aircraft logbook, a mechanic must enter

1—the date the major repair was started.
2—total time in service for the aircraft.
3—his or her name and date the work was performed.
4—total aircraft time since the last overhaul.

4470. What action is required when a minor repair is performed on a certificated aircraft?

1—An FAA Form 337 must be completed.
2—The aircraft specifications must be amended.
3—An entry in the aircraft's permanent records is required.
4—The owner of the aircraft must report the repair to the FAA.

4471. After making a major repair to an aircraft engine that is to be returned to service, FAA Form 337, Major Repair and Alteration, must be prepared. How many copies are required and what is the disposition of the completed forms?

1—Two; both copies for the FAA.
2—Two; one copy for the aircraft owner and one copy for the FAA.
3—Three; one copy for the aircraft owner and two copies for the FAA.
4—Three; one copy for the aircraft owner, one copy for the FAA, and one copy for the permanent records of the repairing agency or individual.

4472. Who is responsible for maintaining the required maintenance records for an airplane?

1—Authorized inspector.
2—Repair station operator.
3—Certificated mechanic.
4—Aircraft owner.

4473. Each person performing an annual or 100-hour inspection shall use a checklist that contains at least those items in the appendix of

1—FAR Part 43.
2—FAR Part 65.
3—FAR Part 91.
4—Advisory Circular 43.13-3.

4474. An FAA Form 337 is used to record and document which of the following?

1—Preventive and routine maintenance.
2—Major repairs and major alterations.
3—Minor repairs and minor alterations.
4—Airworthiness Directive compliance.

4475. After a mechanic holding an airframe and powerplant rating completes a 100-hour inspection, what action is required before the aircraft is returned to service?

1—Obtain a renewal for the airworthiness certificate.
2—Make the proper entries in the aircraft's maintenance record.
3—Complete an operational check of all systems.
4—A mechanic with an Inspection Authorization must approve the inspection.

4476. Which statement is correct concerning the completion of an FAA Form 337, Major Repair and Alteration Form?

1—The certificate number of the person approving the major repair or alteration need not be recorded on the form.
2—Weight and balance computations are not necessary if the empty weight change is less than 1 percent.
3—A clear, concise, and legible description of the work to be accomplished.
4—Flight test results should be recorded on the form.

4477. Each person performing an annual or 100-hour inspection shall use a checklist that contains at least those items in FAR Part 43, Appendix

1—D.
2—A.
3—B.
4—C.

4478. A certificated airframe and powerplant mechanic is authorized to approve for return to service an aircraft after a

1—100-hour inspection.
2—certification inspection.
3—major alteration.
4—major repair.

4479. The force that can be produced by an actuating cylinder whose piston has a cross-sectional area of 3 square inches operating in a 1,000 PSI hydraulic system is most nearly

1—300 pounds.
2—3,000 pounds.
3—334 pounds.
4—1,000 pounds.

4480. The boiling point of a given liquid varies

1—inversely with volume.
2—directly with pressure.
3—inversely with pressure.
4—directly with volume.

4481. One of the following equals 1 horsepower.

1—2,000 ft./lb. of work per minute.
2—550 ft./lb. of work per minute.
3—2,000 ft./lb. of work per second.
4—33,000 ft./lb. of work per minute.

4482. Which of the following is not considered a method of heat transfer?

1—Convection.
2—Conduction.
3—Diffusion.
4—Radiation.

4483. An engine that weighs 350 pounds is removed from an aircraft by means of a mobile hoist. The engine is raised 3 feet above its attachment mount, and the entire assembly is then moved forward 12 feet. A constant force of 70 pounds is required to move the loaded hoist. What is the total work input required to move the hoist?

1—840 ft./lb.
2—22,680 ft./lb.
3—1,890 ft./lb.
4—1,050 ft./lb.

4484. Which of the following is the actual amount of water vapor in a mixture of air and water?

1—Relative humidity.
2—Dew point.
3—Absolute humidity.
4—Vapor pressure.

4485. Under which of the following conditions will the rate of flow of a liquid through a metering orifice (or jet) be the greatest?

1—Unmetered pressure – 18 PSI,
metered pressure – 17.5 PSI,
atmospheric pressure – 14.5 PSI.
2—Unmetered pressure – 23 PSI,
metered pressure – 12 PSI,
atmospheric pressure – 14.3 PSI.
3—Unmetered pressure – 17 PSI,
metered pressure – 5 PSI,
atmospheric pressure – 14.7 PSI.
4—Unmetered pressure – 15 PSI,
metered pressure – 12 PSI,
atmospheric pressure – 14.7 PSI.

4486. Which of the following is the portion of atmospheric pressure exerted by the moisture in the air?

1—Absolute humidity.
2—Relative humidity.
3—Dew point.
4—Vapor pressure.

4487. Using Figure 50, the amount of force applied to rope A to lift the weight is

1—12 pounds.
2—15 pounds.
3—20 pounds.
4—30 pounds.

4488. Which of the following will weigh the least?

1—98 parts of dry air and 2 parts of water vapor.
2—35 parts of water vapor and 65 parts of dry air.
3—100 parts of dry air.
4—50 parts of dry air and 50 parts of water vapor.

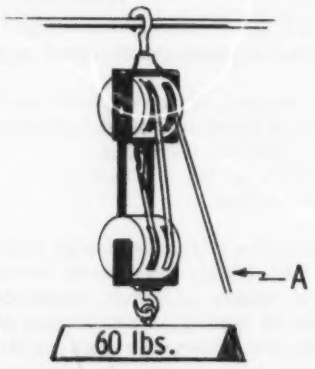

Figure 50

4489. Which of the following is the ratio of the water vapor actually present in the atmosphere to the amount that would be present if the air were saturated at the prevailing temperature and pressure?

1—Absolute humidity.
2—Relative humidity.
3—Dew point.
4—Vapor pressure.

4490. If a 120–pound force moves a 3,200 pound object 20 feet in 20 seconds along a straight horizontal path, how much power was expended?

1—100 ft./lb. per second.
2—2,400 ft./lb. per second.
3—3,200 ft./lb. per second.
4—120 ft./lb. per second.

4491. If the container volume of a confined gas is doubled (assume temperature remains constant), the pressure will

1—increase in direct proportion to the volume increase.
2—remain the same.
3—be doubled.
4—be reduced to one–half its original value.

4492. If the temperature of a confined liquid is held constant and its pressure is tripled, the volume will

1—triple.
2—be increased one–third its original volume.
3—be reduced to one–third its original volume.
4—remain the same.

4493. If the pressure of an air mass is doubled, with all other conditions constant, its density

1—is doubled.
2—varies inversely as the pressure increases.
3—is decreased.
4—remains the same.

4494. How much work input is required to lower (not drop) a 120–pound weight from the top of a 3–foot table to the floor?

1—120 lb. of force.
2—120 ft./lb.
3—360 ft./lb.
4—None.

4495. Which of the following atmospheric conditions will cause the true landing speed of an aircraft to be the greatest?

1—Low temperature with high humidity.
2—Low temperature with low humidity.
3—High temperature with low humidity.
4—High temperature with high humidity.

4496. If the fluid pressure is 800 PSI in a 1/2-inch line supplying an actuating cylinder with a piston area of 10 square inches, the force exerted on the piston will be

1—4,000 pounds.
2—1,600 pounds.
3—8,000 pounds.
4—800 pounds.

4497. How many of the following factors are necessary to determine power?

(1) Force exerted.
(2) Distance the force moves.
(3) Time required to do the work.

1—None.
2—One.
3—Two.
4—Three.

4498. What force must be applied to roll a 120-pound barrel up an inclined plane 9 feet long to a height of 3 feet (disregard friction)?

L ÷ l = R ÷ E
L = Length of ramp, measured along the slope.
l = Height of ramp.
R = Weight of object to be raised or lowered.
E = Force required to raise or lower object.

1—40 lb.
2—120 lb.
3—360 lb.
4—393 lb.

4499. Which of the following statements concerning the concepts of heat and temperature is true?

1—There is a direct relationship between temperature and heat.
2—There is an inverse variation between temperature and heat.
3—Temperature is a measure of intensity of heat.
4—Temperature is a measure of quality of heat.

4500. What is absolute humidity?

1—The portion of atmospheric pressure that is exerted by the moisture in the air.
2—The temperature to which humid air must be cooled at constant pressure to become saturated.
3—The actual amount of the water vapor in a mixture of air and water.
4—The ratio of the water vapor actually present in the atmosphere to the amount that would be present if the air were saturated at the prevailing temperature and pressure.

4501. If the operating pressure is 2,000 PSI in a 1/2-inch line feeding an actuating cylinder which has a piston area of 10 square inches, the maximum weight the piston can lift will be

1—40,000 lb.
2—20,000 lb.
3—10,000 lb.
4—2,000 lb.

4502. Which of the following is the temperature to which humid air must be cooled at constant pressure to become saturated?

1—Dew point.
2—Vapor pressure.
3—Absolute humidity.
4—Relative humidity.

4503. If both the volume and the absolute temperature of a confined gas are doubled, the pressure will

1—not change.
2—be doubled.
3—be halved.
4—become four times as great.

4504. FAA Airworthiness Directives are issued to

1—provide temporary maintenance procedure.
2—prescribe airman privileges and limitations.
3—present suggested maintenance procedures.
4—correct an unsafe condition.

4505. (1) A Supplemental Type Certificate may be issued to more than one applicant for the same design change, providing each applicant shows compliance with the applicable airworthiness requirement.

(2) An installation of an item manufactured in accordance with the Technical Standard Order system requires no further approval for installation in a particular aircraft.

Regarding the above statements, which of the following is true?

1—Only No. 2 is true.
2—Both No. 1 and No. 2 are true.
3—Neither No. 1 nor No. 2 is true.
4—Only No. 1 is true.

4506. For all aircraft type certificated prior to January 1, 1958, the CAA issued documents known as Aircraft Specifications which contained technical information about the aircraft type. If an aircraft was type certificated May 7, 1959, the information that would formerly have been contained in the Aircraft Specifications will be in the appropriate

1—Aircraft Operation Information Letters.
2—Certificated Aircraft Bulletins.
3—Type Certificate Data Sheets.
4—Aviation Airworthiness Alerts.

4507. Which of the following issues Airworthiness Directives?

1—National Transportation Safety Board.
2—Air Transport Association.
3—Manufacturers.
4—Federal Aviation Administration.

4508. Which of the following is contained in a Type Certificate Data Sheet?

1—Maximum fuel grade to be used.
2—All pertinent minimum weights.
3—Control surface adjustment points.
4—Location of the datum.

4509. Suitability for use of a specific propeller with a particular engine–airplane combination can be determined by reference to what informational source?

1—Propeller Listing.
2—Propeller Specifications.
3—Aircraft Specifications or Type Certificate Data Sheet.
4—Alphabetical Index of Current Propeller Type Certificate Data Sheets, Specifications, and Listings.

4510. If an airworthy aircraft is sold, what is done with the Airworthiness Certificate?

1—It must be endorsed by a certificated mechanic to indicate that the aircraft is still airworthy.
2—It becomes invalid until the aircraft is reinspected and returned to service.
3—It is declared void and a new certificate is issued upon application by the new owner.
4—It is transferred with the aircraft.

4511. FAA Airworthiness Directives

1—are mandatory.
2—present design changes.
3—provide temporary maintenance procedures.
4—provide suggested maintenance procedures.

4512. Which Part of the Federal Aviation Regulations governs the issuance of an Airworthiness Certificate?

1—Part 23.
2—Part 21.
3—Part 25.
4—Part 39.

4513. Specifications pertaining to an aircraft, of which a limited number were manufactured under a type certificate and for which there is no current Aircraft Specification, can be found in the

1—Alphabetical Index of Antique Aircraft.
2—Aircraft Listing.
3—FAA Statistical Handbook of Civil Airplane Specifications.
4—Annual Summary of Deleted and Discontinued Aircraft Specifications.

4514. Where are technical descriptions of certificated propellers found?

1—Applicable Airworthiness Directives.
2—Aircraft Listings.
3—Aircraft Specifications.
4—Propeller type certificates.

4515. Which of the following is generally contained in Aircraft Specifications or Type Certificate Data Sheets?

1—Empty weight of the aircraft.
2—Useful load of aircraft.
3—Payload of aircraft.
4—Control surface movements.

4516. Placards required on an aircraft are specified in

1—Advisory Circular 43.13–1A.
2—the aircraft logbook.
3—Federal Aviation Regulations under which the aircraft was type certificated.
4—Aircraft Specifications or Type Certificate Data Sheets.

4517. Technical information about older aircraft models, of which no more than 50 remain in service, can be found in the

1—Aircraft Listing.
2—Annual Summary of Deleted and Discontinued Aircraft Specifications.
3—Alphabetical Index of Antique Aircraft.
4—FAA Statistical Handbook of Civil Airplane Specifications.

4518. (1) The Federal Aviation Regulations require approval after compliance with the data of a Supplemental Type Certificate.

(2) An installation of an item manufactured in accordance with the Technical Standard Order system requires no further approval for installation in a particular aircraft.

Regarding the above statements, which of the following is true?

1—Only No. 2 is true.
2—Both No. 1 and No. 2 are true.
3—Neither No. 1 nor No. 2 is true.
4—Only No. 1 is true.

4519. Which of the following would provide information regarding instrument range markings for an airplane certificated in the normal category?

1—FAR Part 21.
2—FAR Part 25.
3—FAR Part 91.
4—FAR Part 23.

4520. (1) Propellers are not included in the Airworthiness Directive system.

(2) A certificated powerplant mechanic may make a minor repair on a propeller and approve for return to service.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Only No. 2 is true.
3—Both No. 1 and No. 2 are true.
4—Neither No. 1 nor No. 2 is true.

4521. What publication would a mechanic use to determine the fuel quantity and octane rating for a specific aircraft?

1—Type Certificate Data Sheet.
2—Manufacturers' Parts Manual.
3—Summary of Supplemental Type Certificates.
4—Federal Aviation Regulations.

4522. An aircraft mechanic is privileged to perform major alterations on United States certificated aircraft; however, the work must be done in accordance with technical data approved by the Administrator before the aircraft can be approved for return to service. Which of the following is not approved data?

1—FAA Airworthiness Directives.
2—Advisory Circular 43.13-2A.
3—Type Certificate Data Sheets.
4—Manufacturers' manuals when FAA approved.

4523. What is the maintenance recording responsibility of the person who complies with an Airworthiness Directive?

1—Advise the aircraft owner/operator of the work performed.
2—Make an entry in the maintenance record of that equipment.
3—Advise the FAA district office of the work performed, by submitting an FAA Form 337.
4—Record of entry is not required of the person performing the work. The aircraft owner/operator is responsible for recording maintenance.

4524. (1) Manufacturer's data and FAA publications such as Airworthiness Directives, Type Certificate Data Sheets, and Advisory Circulars are all approved data.

(2) FAA publications such as Technical Standard Orders, Airworthiness Directives, Type Certificate Data Sheets, and Aircraft Specifications and Supplemental Type Certificates are all approved data.

In regard to the above statements, which is correct?

1—Both No. 1 and No. 2 are true.
2—Only No. 1 is true.
3—Neither No. 1 nor No. 2 is true.
4—Only No. 2 is true.

4525. The following is the compliance portion of an Airworthiness Directive. "Compliance required as indicated, unless already accomplished:

I. Aircraft with less than 500-hours' total time in service: Inspect in accordance with instructions below at 500-hours' total time, or within the next 50-hours' time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service.

II. Aircraft with 500-hours' through 1,000-hours' total time in service: Inspect in accordance with instructions below within the next 50-hours' time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service.

III. Aircraft with more than 1,000-hours' time in service: Inspect in accordance with instructions below within the next 25-hours' time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service."

An aircraft has a total time in service of 468 hours. The Airworthiness Directive given was initially complied with at 454 hours in service. How many additional hours in service may be accumulated before the AD must again be complied with?

1—32.
2—46.
3—200.
4—186.

4526. Using Figure 51, which type of lubricant is used for the nose door link?

1—Oil, general purpose, low temperature lubricating.
2—Grease, general purpose.
3—Oil, lubricating, aircraft engine.
4—Grease, low temperature aircraft lubricating.

4527. Determine the frequency of lubrication of the pivot bushing. (See Figure 51.)

1—100 hours.
2—50 hours.
3—500 hours.
4—1,000 hours.

4528. Using Figure 51, what method is used to lubricate the nose door links?

1—Filler can.
2—Grease gun.
3—Hand.
4—Squirt can.

FREQUENCY	METHOD	TYPE OF LUBRICANT
50 HOUR 100 HOUR 500 HOUR 1000 HOUR ON ASSEMBLY	HAND SQUIRT CAN FILLER CAN GREASE GUN	GGP.....Grease, General Purpose GLT.....Grease, Low Temperature Aircraft Lubricating (Low Volatility Type) OGP.....Oil, General Purpose, Low Temperature Lubricating OHA.....Hydraulic Fluid, Petroleum Base FG.....Graphite, Lubricating OAI.....Oil, Lubricating Aircraft Instrument (Low Volatility) P.....Petrolatum or Terminal Grease OEA.....Oil, Lubricating, Aircraft Engine. Aviation Grade Straight Mineral Oil SAE 50 above 40° F SAE 30 Below 40° F Grade 1100 above 40° F Grade 1065 below 40° F If detergent oil is used after the first 25 hours of operation, it must conform to Continental Motors Specification MHS-24A. Where OEA is shown with squirt can, use SAE 20.

NOSE GEAR LINKAGE

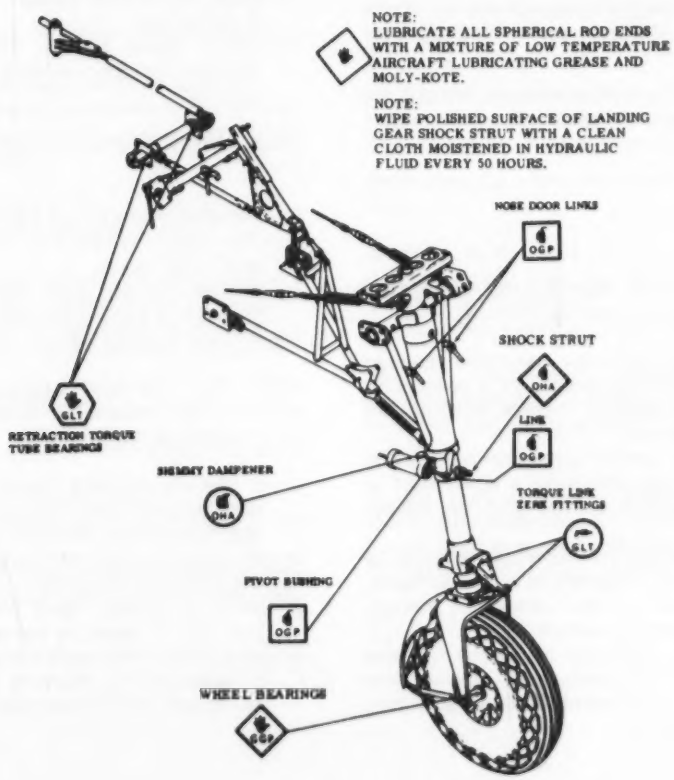

Figure 51

4529. The following is a table of airspeed limits as given in an FAA-issued aircraft specification:

Normal operating speed	260 knots
Never-exceed speed	293 knots
Maximum landing gear operation speed	174 knots
Maximum flap extended speed	139 knots

The high end of the white arc on the airspeed instrument would be at

1—260 knots.
2—293 knots.
3—174 knots.
4—139 knots.

4530. A complete detailed inspection and adjustment of the valve mechanism will be made at the first 25 hours after the engine has been placed in service. Subsequent inspections of the valve mechanism will be made each second 50-hour period.

From the above statement, at what intervals will valve mechanism inspections be performed?

1—100 hours.
2—25 hours.
3—50 hours.
4—75 hours.

4531. Check thrust bearing nuts for tightness on new or newly overhauled engines at the first 50-hour inspection following installation. Subsequent inspections on thrust bearing nuts will be made at each third 50-hour inspection.

From the above statement, at what intervals should you check the thrust bearing nut for tightness?

1—150 hours.
2—50 hours.
3—100 hours.
4—200 hours.

4532. Which statement is true regarding the privileges of a certificated mechanic with a powerplant rating?

1—They may perform the 100-hour inspection required by the Federal Aviation Regulations on a powerplant or propeller or any component thereof, but may not release the same to service.
2—They may perform the annual inspection required by the Federal Aviation Regulations on a powerplant or propeller or any component thereof, and may release the same to service.
3—They may perform the annual inspection required by the Federal Aviation Regulations on airframe, powerplant, or propeller or any component thereof, and may release the same to service.
4—They may perform the 100-hour inspection required by the Federal Aviation Regulations on a powerplant or propeller or any component thereof, and may release the same to service.

4533. Who has the authority to approve an aircraft for return to service after a 100-hour inspection?

1—A mechanic of any certificated repair station.
2—A certificated mechanic with an airframe rating.
3—A mechanic holding a repairman certificate.
4—A certificated mechanic with an airframe and powerplant rating.

4534. A repair, as performed on an airframe, shall mean

1—the upkeep and preservation of the airframe including the component parts thereof.
2—the restoration of the airframe to a condition for safe operation after damage or deterioration.
3—an appreciable change in the weight, balance, structural strength, performance, flight characteristics, or other qualities affecting the airworthiness of the airframe.
4—simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations.

4535. The replacement of fabric on fabric-covered parts such as wings, fuselages, stabilizers, or control surfaces is considered to be a

1—minor repair unless the new cover is different in any way from the original cover.
2—minor repair unless the underlying structure is altered or repaired.
3—major repair even though no other alteration or repair is performed.
4—minor repair unless the method of covering is changed or the underlying structure is altered or repaired.

4536. Which of the following is classified as a major repair?

1—Removal, installation, and repair of landing gear tires.
2—The repair of portions of skin sheets by making additional seams.
3—Troubleshooting and repairing broken circuits in landing light wiring circuits.
4—Replacing safety belts.

4537. The 100-hour inspection required by Federal Aviation Regulations for certain aircraft being operated for hire may be performed by

1—a person working under the supervision of an appropriately rated mechanic, but the aircraft must be approved by the mechanic for return to service.
2—an appropriately rated mechanic only if he/she has an inspection authorization.
3—an appropriately rated mechanic and approved by him/her for return to service.
4—an appropriately rated mechanic, but the aircraft must be approved for return to service by a mechanic with an inspection authorization.

4538. A person working under the supervision of a certificated mechanic with an airframe and powerplant rating is not authorized to perform which of the following?

1—Repair fabric covering involving an area greater than that required to repair two adjacent wing ribs.
2—Repair a wing brace strut by welding.
3—A 100-hour inspection.
4—Repair an engine mount by riveting.

4539. A mechanic certificate is effective for what period of time?

1—As long as duties are performed under the certificate for at least 60 days within the preceding 6 months.
2—24 calendar months.
3—As long as duties are performed under the certificate for at least 90 days within the preceding 12 months.
4—Until surrendered, suspended, or revoked.

4540. A certificated mechanic is not privileged to perform any repair to, or alteration of

1—a propeller.
2—air-conditioning and pressurization systems.
3—an electrically heated windshield system.
4—an instrument.

4541. An Airworthiness Directive requires that a propeller be altered. A certificated mechanic could

1—perform and approve the work for return to service if it is a minor alteration.
2—not approve the work for return to service because it is an alteration.
3—not perform the work because it is an alteration.
4—not perform the work because he/she is not allowed to perform and approve for return to service, repairs or alterations to propellers.

4542. Which of the following is a privilege of a certificated mechanic with a powerplant rating?

1—Minor repairs to, and minor alterations of, propellers.
2—Minor repairs to, and major alterations of, propellers.
3—Major repairs to, and minor alterations of, propellers.
4—Major repairs to, and major alterations of, propellers.

4543. FAA certificated mechanics may

1—approve for return to service a major repair for which they are rated.
2—supervise and approve a 100-hour inspection.
3—perform an annual inspection appropriate to the rating(s) they hold.
4—approve for return to service a minor alteration they have performed appropriate to the rating(s) they hold.

4544. A certificated mechanic with a powerplant rating may perform the

1—annual inspection required by the Federal Aviation Regulations on a powerplant or any component thereof and approve and return the same to service.
2—100-hour inspection required by the Federal Aviation Regulations on a powerplant or any component thereof and approve and return the same to service.
3—annual inspection required by the Federal Aviation Regulations on an airframe, powerplant, or any component thereof and return the same to service.
4—100-hour inspection required by the Federal Aviation Regulation on an airframe, powerplant, or any other component thereof and approve and return the same to service.

4545. A certificated mechanic shall not exercise the privileges of the certificate and rating unless, within the preceding 24 months, the Administrator has found that the certificate holder is able to do the work or the certificate holder has

1—served as a mechanic under the certificate and rating for at least 18 months.
2—served as a mechanic under the certificate and rating for at least 12 months.
3—technically supervised other mechanics for at least 3 months.
4—served as a mechanic under the certificate and rating for at least 6 months.

4546. (1) A certificated mechanic with an airframe rating may perform a minor repair to an airspeed indicator providing he/she has the necessary equipment available.

(2) A certificated mechanic with a powerplant rating may perform a major repair to a propeller providing he/she has the necessary equipment available.

Regarding the above statements, which of the following is true?

1—Only No. 1 is true.
2—Neither No. 1 nor No. 2 is true.
3—Only No. 2 is true.
4—Both No. 1 and No. 2 are true.

4547. A certificated mechanic must notify the Administrator of the Federal Aviation Administration of any changes in permanent mailing address in writing within

1—48 hours after such changes.
2—30 days after such changes.
3—60 days after such changes.
4—90 days after such changes.

4548. Who is responsible for determining that materials used in aircraft maintenance and repair are of the proper type and conform to the appropriate standards?

1—The installing person or agency.
2—The owner of the aircraft.
3—The supplier of the material.
4—The manufacturer of the aircraft.

4549. The replacement of a damaged engine mount with a new identical engine mount purchased from the aircraft manufacturer is considered a

1—major alteration.
2—minor alteration.
3—major repair.
4—minor repair.

4550. Who has the authority to approve for return to service a powerplant or propeller or any part thereof after a 100-hour inspection?

1—A mechanic with a powerplant rating.
2—A mechanic with an airframe rating.
3—Any certificated repairman.
4—Personnel of any certificated repair station.

4551. Instrument repairs may be performed

1—by the instrument manufacturer only.
2—by an FAA-approved instrument repair station.
3—on airframe instruments by mechanics with an airframe rating.
4—on powerplant instruments by mechanics with a powerplant rating.

APPENDIX 2

The abbreviations listed below are used to identify the reference associated with each test question listed in Appendix 1.

AC	—	Advisory Circular
AL	—	Aircraft Listing
AMP	—	Aircraft Materials and Processes by George F. Titterton
AP	—	Aircraft Powerplants by Northrop Aeronautical Institute
APP	—	Aircraft Propulsion Powerplants by Cargnino – Karvinen
EEA	—	Electricity and Electronics for Aerospace Vehicles by Northrop Institute of Technology
FAR	—	Federal Aviation Regulations
FED	—	Fundamentals of Engineering Drawing by Warren J. Lugadder
MBM	—	Marathon Battery Instruction Manual
NH	—	Navy Handtools
PAV	—	Powerplants for Aerospace Vehicles NIT
SBM	—	Sonotone Battery Instruction Manual
TCD	—	Type Certificate Data Sheets

Item	*Reference*	*Item*	*Reference*	*Item*	*Reference*	*Item*	*Reference*
4001.	AC 65–9A	**4028.**	AC 65–9A	**4055.**	AC 65–9A	**4082.**	AC 65–9A
4002.	AC 65–9A	**4029.**	AC 65–9A	**4056.**	AC 65–9A	**4083.**	AC 65–9A
4003.	AC 65–9A	**4030.**	AC 65–9A	**4057.**	AC 65–9A	**4084.**	AC 65–9A
4004.	AC 65–9A	**4031.**	AC 43.13–1A	**4058.**	AC 65–9A	**4085.**	AC 65–9A
4005.	EEA	**4032.**	AC 65–9A	**4059.**	AC 65–9A	**4086.**	AC 65–9A
4006.	AC 65–9A	**4033.**	AC 65–9A	**4060.**	AC 65–9A	**4087.**	AC 65–9A
4007.	AC 65–9A	**4034.**	EEA	**4061.**	AC 65–9A	**4088.**	AC 43.13–1A
4008.	AC 65–9A	**4035.**	EEA	**4062.**	AC 65–9A	**4089.**	MBM
4009.	AC 65–9A	**4036.**	EEA	**4063.**	AC 65–9A	**4090.**	SBM
4010.	AC 65–9A	**4037.**	EEA	**4064.**	AC 65–9A	**4091.**	AC 65–9A
4011.	AC 65–9A	**4038.**	AC 65–9A	**4065.**	AC 65–9A	**4092.**	AC 65–9A
4012.	AC 65–9A	**4039.**	AC 65–9A	**4066.**	AC 65–9A	**4093.**	AC 65–9A
4013.	EEA	**4040.**	AC 65–9A	**4067.**	AC 65–9A	**4094.**	AC 65–9A
4014.	AC 65–9A	**4041.**	EEA	**4068.**	AC 65–9A	**4095.**	AC 65–9A
4015.	AC 65–9A	**4042.**	AC 65–9A	**4069.**	AC 65–9A	**4096.**	AC 65–9A
4016.	AC 65–9A	**4043.**	AC 65–9A	**4070.**	AC 65–9A	**4097.**	AC 65–9A
4017.	AC 65–9A	**4044.**	AC 65–9A	**4071.**	AC 65–9A	**4098.**	AC 65–9A
4018.	AC 65–9A	**4045.**	AC 65–9A	**4072.**	AC 65–9A	**4099.**	AC 65–9A
4019.	AC 65–9A	**4046.**	AC 65–9A	**4073.**	AC 65–9A	**4100.**	AC 65–9A
4020.	AC 65–9A	**4047.**	AC 65–9A	**4074.**	AC 43.13–1A	**4101.**	AC 65–9A
4021.	AC 65–9A	**4048.**	AC 65–9A	**4075.**	APP	**4102.**	AC 65–9A
4022.	AC 65–9A	**4049.**	AC 65–9A	**4076.**	APP	**4103.**	AC 65–9A
4023.	AC 65–9A	**4050.**	AC 65–9A	**4077.**	EEA	**4104.**	AC 65–9A
4024.	AC 65–9A	**4051.**	AC 65–9A	**4078.**	AC 65–9A	**4105.**	AC 65–9A
4025.	AC 65–9A	**4052.**	AC 43.13–1A	**4079.**	AC 65–9A	**4106.**	AC 65–9A
4026.	AC 65–9A	**4053.**	AC 65–9A	**4080.**	AC 65–9A	**4107.**	AC 65–9A
4027.	AC 65–9A	**4054.**	AC 65–9A	**4081.**	AC 65–9A	**4108.**	AC 65–9A

Item	Reference
4109.	AC 65–9A
4110.	AC 65–9A
4111.	AC 65–9A
4112.	AC 65–9A
4113.	AC 65–9A
4114.	AC 65–9A
4115.	AC 65–9A
4116.	AC 65–9A
4117.	AC 65–9A
4118.	AC 65–9A
4119.	AC 65–9A
4120.	AC 65–9A
4121.	AC 65–9A
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4131.	AC 65–9A
4132.	AC 65–9A
4133.	FED
4134.	AC 65–9A
4135.	AC 65- 9A
4136.	AC 65–9A
4137.	AC 43.13–1A
4138.	AC 43.13–1A
4139.	AC 43.13–1A
4140.	AC 43.13–1A
4141.	AC 43.13–1A
4142.	AC 65–15A
4143.	AC 65–9A
4144.	AC 65–9A
4145.	AC 65–9A
4146.	AC 65–9A
4147.	AC 65–9A
4148.	AC 65–9A
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4159.	AC 65–9A
4160.	AC 65–9A
4161.	AC 43.13–1A
4162.	AC 65–9A
4163.	AC 43.13–1A
4164.	AC 65–9A
4165.	AC 65–9A
4166.	FAR 23.29
4167.	AC 65–9A
4168.	AC 65–9A
4169.	AC 65–9A
4170.	AC 65–9A
4171.	FAR 23.29
4172.	AC 65–9A
4173.	AC 65–9A
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4175.	AC 65–9A
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4177.	AC 65–9A
4178.	AC 43.13–1A
4179.	AC 43.13–1A
4180.	AC 65–9A
4181.	AC 65–9A
4182.	AC 43.13–1A
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4189.	AC 65–9A
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4193.	AC 43.13–1A
4194.	AC 43.13–1A
4195.	AC 65–9A
4196.	AC 43.13–1A
4197.	AC 65–9A
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4273.	AC 65–9A
4274.	AC 43.13–1A
4275.	AC 65–9A
4276.	AC 65–9A

Item	Reference
4277.	AC 65–9A
4278.	AC 65–9A
4279.	AC 65–9A
4280.	AC 43.13–1A
4281.	AC 65–9A
4282.	AC 65–9A
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4293.	AC 65–9A
4294.	AC 43.13–1A
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4297.	AC 65–15A
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4299.	AC 65–9A
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4314.	PAV
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4316.	PAV
4317.	PAV
4318.	PAV
4319.	AP
4320.	AC 65–9A
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4329.	AC 65–9A
4330.	AC 65–9A
4331.	AP
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4373.	AC 65–9A
4374.	AMP
4375.	AC 65–9A
4376.	AC 65–9A
4377.	AC 43.13–1A
4378.	AC 65–9A
4379.	AC 65–9A
4380.	AC 65–12A
4381.	AC 65–9A
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4443.	AC 65–9A
4444.	AC 65–9A

Item	Reference	Item	Reference	Item	Reference	Item	Reference
4445.	AC 65–9A	**4472.**	FAR 91.173	**4499.**	AC 65–9A	**4526.**	FAR 43.13
4446.	AC 65–9A	**4473.**	FAR 43.15(c)	**4500.**	AC 65–9A	**4527.**	FAR 43.13
4447.	AC 65–9A	**4474.**	FAR 43	**4501.**	AC 65–9A	**4528.**	FAR 43.13
4448.	AC 65–9A	**4475.**	FAR 43.9	**4502.**	AC 65–9A	**4529.**	FAR 1.1
4449.	AC 65–9A	**4476.**	FAR 43.9(1)(d)	**4503.**	AC 65–9A	**4530.**	FAR 43.13
4450.	AC 65–9A	**4477.**	FAR 43.15(c)	**4504.**	FAR 39	**4531.**	FAR 43.13
4451.	AC 65–9A	**4478.**	FAR 43.7	**4505.**	FAR 21	**4532.**	FAR 65.81
4452.	AC 65–9A	**4479.**	AC 65–9A	**4506.**	FAR 21	**4533.**	FAR 65.85
4453.	AC 65–9A	**4480.**	AC 65–9A	**4507.**	FAR 39	**4534.**	FAR 43
4454.	AC 65–9A	**4481.**	AC 65–9A	**4508.**	AC 65–9A	**4535.**	FAR 43
4455.	AC 65–9A	**4482.**	AC 65–9A	**4509.**	TCD	**4536.**	FAR 43
4456.	FAR 21.197	**4483.**	AC 65–9A	**4510.**	FAR 21.179	**4537.**	FAR 65.87
4457.	AC 65–9A	**4484.**	AC 65–9A	**4511.**	AC 65–9A	**4538.**	FAR 65.81
4458.	FAR 43.11	**4485.**	AC 65–9A	**4512.**	FAR 21	**4539.**	FAR 65.15
4459.	AC 65–9A	**4486.**	AC 65–9A	**4513.**	FAR 21	**4540.**	FAR 65.81
4460.	AC 65–19B	**4487.**	AC 65–9A	**4514.**	TCD	**4541.**	FAR 65.81(a)
4461.	FAR 43	**4488.**	AC 65–9A	**4515.**	TCD	**4542.**	FAR 65.79
4462.	FAR 43	**4489.**	AC 65–9A	**4516.**	FAR 43.11(b)	**4543.**	FAR 65.81
4463.	AC 43.13–1A	**4490.**	AC 65–9A	**4517.**	AL	**4544.**	FAR 65.87
4464.	AC 43.13–1A	**4491.**	AC 65–9A	**4518.**	FAR 43.13	**4545.**	FAR 65.83
4465.	AC 43.13–1A	**4492.**	AC 65–9A	**4519.**	FAR 23.1543	**4546.**	FAR 65.81
4466.	AC 43.13–1A	**4493.**	AC 65–9A	**4520.**	FAR 39.1	**4547.**	FAR 65.21
4467.	FAR 43.11	**4494.**	AC 65–9A	**4521.**	TCD	**4548.**	FAR 43.13(6)
4468.	FAR 43.3(b)	**4495.**	AC 65–9A	**4522.**	AC 65–19B	**4549.**	FAR 43
4469.	FAR 43.9	**4496.**	AC 65–9A	**4523.**	AC 65–19B	**4550.**	FAR 65.87
4470.	AC 65–9A	**4497.**	AC 65–9A	**4524.**	AC 65–19B	**4551.**	AC 43.13–1A
4471.	FAR 43	**4498.**	AC 65–9A	**4525.**	FAR 39		

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